

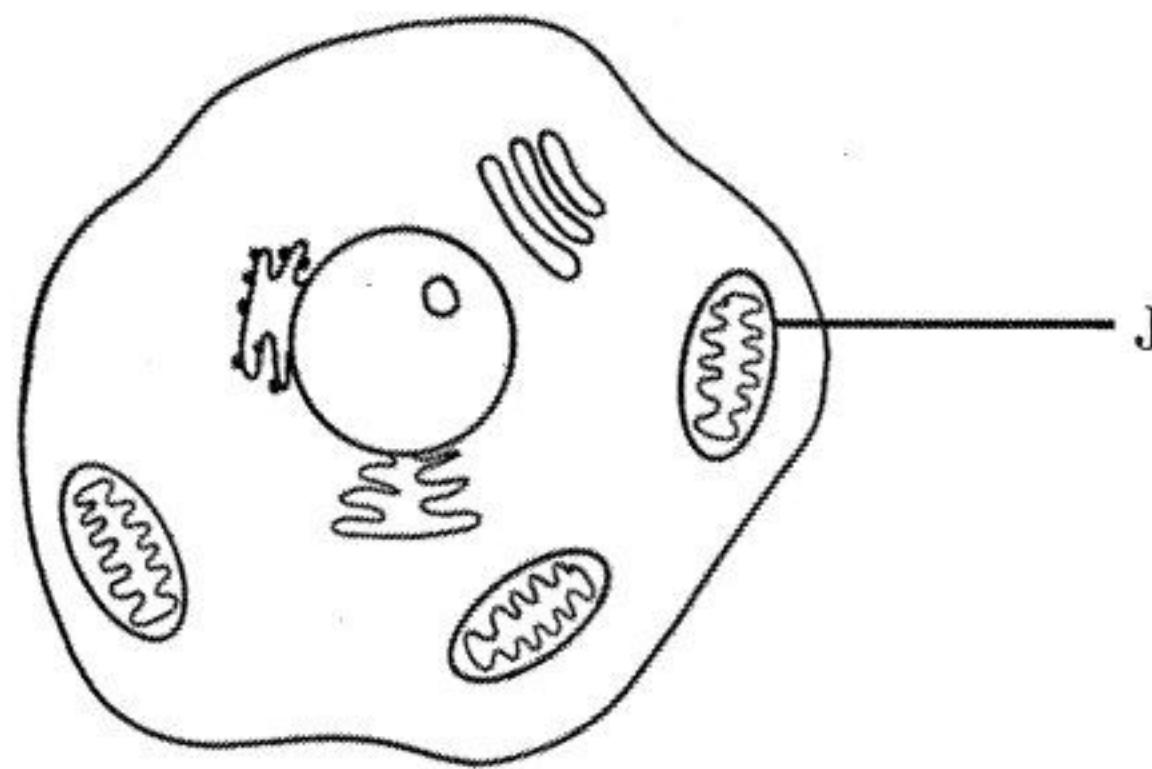
1. Antara yang berikut, manakah bahan sisa biologi kategori D?

Which of the following is category D biological waste?

- A Skalpel
Scalpel
- B Piring petri
Petri dish
- C Organ haiwan
Animal organ
- D Kultur kaldu
Broth culture

2. Rajah 1 menunjukkan satu sel haiwan.

Diagram 1 shows an animal cell.



Rajah 1
Diagram 1

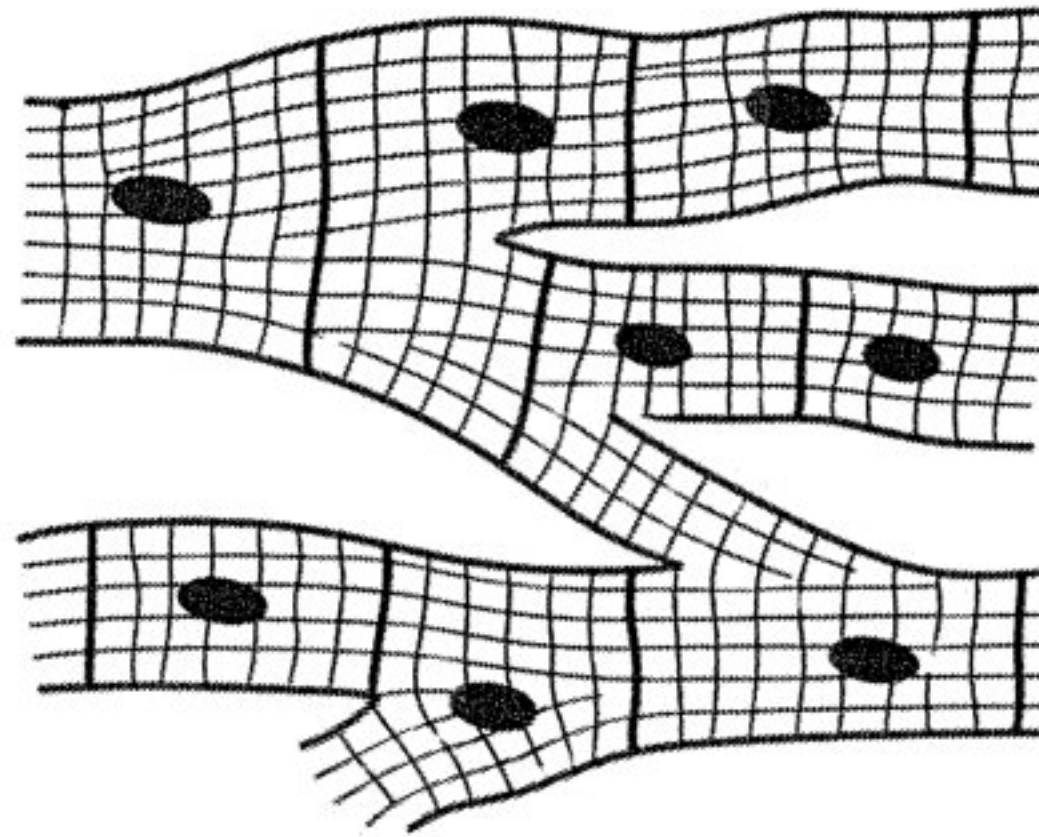
Apakah struktur **J**?

*What is structure **J**?*

- A Nukleus
Nucleus
- B Jasad Golgi
Golgi apparatus
- C Mitokondrion
Mitochondrion
- D Kloroplas
Chloroplast

3. Rajah 2 menunjukkan sejenis tisu haiwan.

Diagram 2 shows a type of animal tissue.



Rajah 2
Diagram 2

Apakah yang berlaku sekiranya tisu tersebut mengendur?

What will happen when the tissue relaxes?

- A Darah mengalir masuk ke dalam atrium kanan dan atrium kiri
Blood flows into the right atrium and left atrium
- B Darah dipam keluar dari ventrikel kanan dan ventrikel kiri
Blood is pumped out from right ventricle and left ventricle
- C Pemvasodilatan semasa suhu badan meningkat
Vasodilation during body temperature increase
- D Lengan diluruskan
Forearm is straightened

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4. Maklumat di bawah menunjukkan gejala yang disebabkan oleh keracunan makanan.

The following information refers to the symptoms of food poisoning.

- Cirit-birit
Diarrhea
- Muntah-muntah
Vomiting

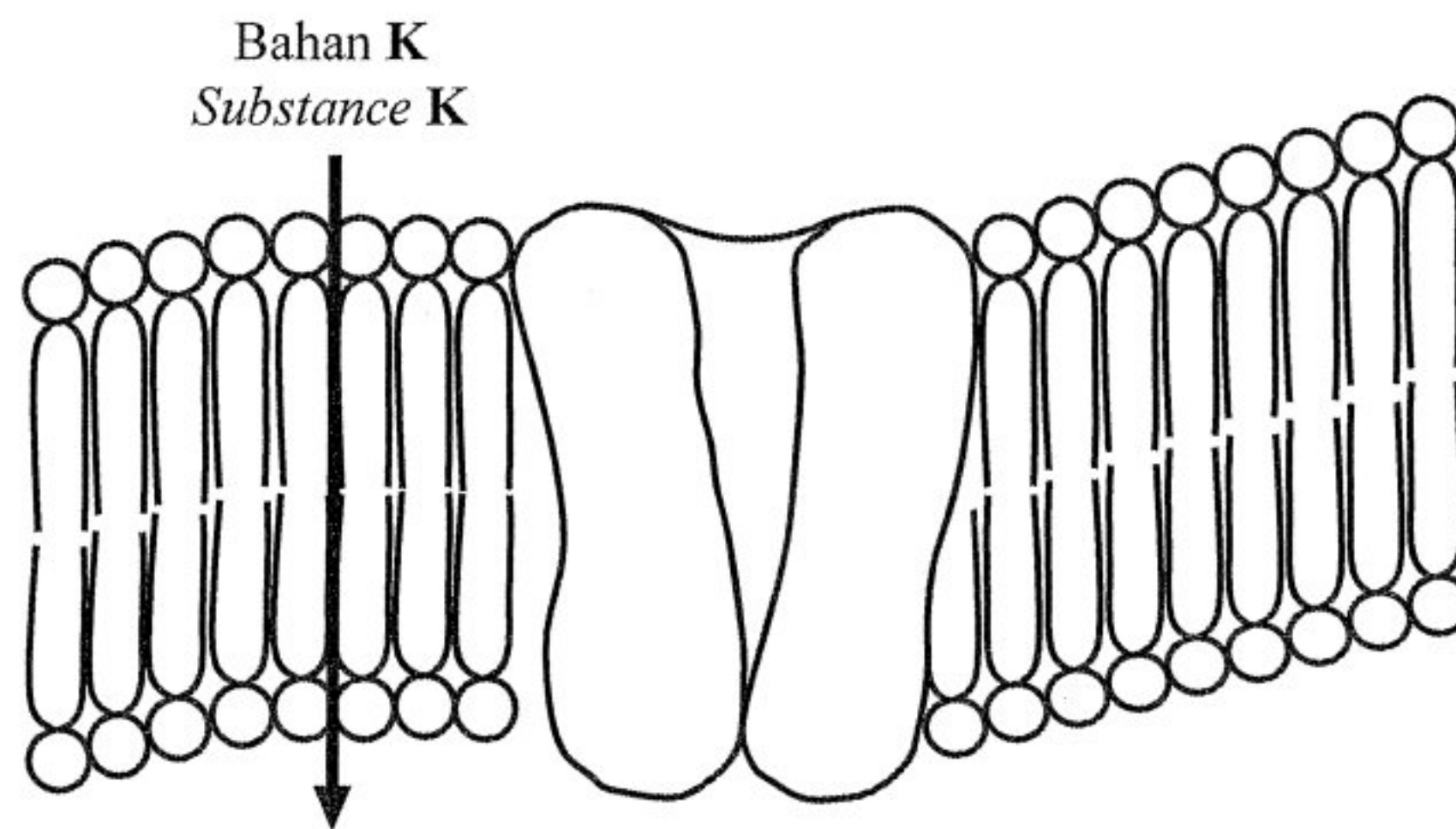
Antara berikut, minuman manakah yang paling sesuai diambil bagi mengatasi masalah tersebut?

Which of the following is the most suitable drink that should be taken to overcome the problem?

- A Air suling
Distilled water
- B Minuman penghidratan semula
Rehydration drink
- C Minuman isotonik
Isotonic drink
- D Larutan saline
Saline solution

5. Rajah 3 menunjukkan pergerakan bahan merentasi membran plasma.

Diagram 3 shows the movement of substances across the plasma membrane.



Rajah 3
Diagram 3

Apakah bahan **K**?

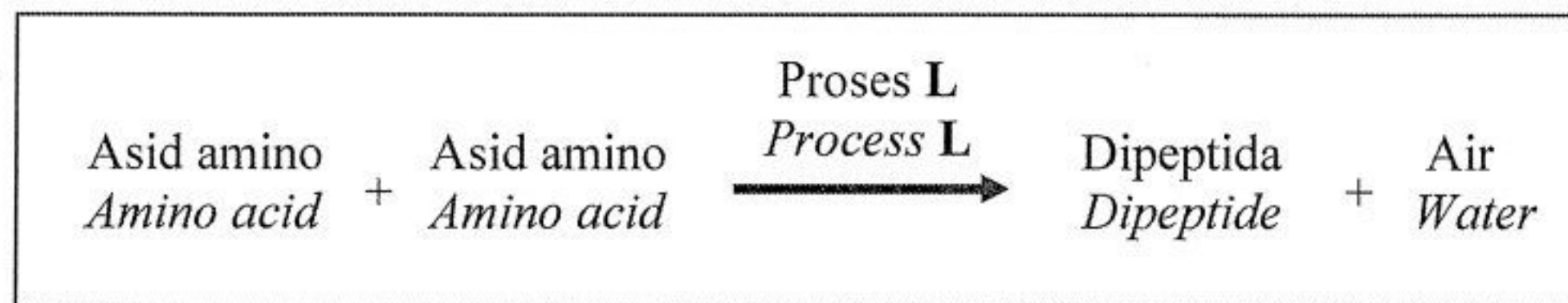
*What is substance **K**?*

- A** Ion kalium
Potassium ion
- B** Asid amino
Amino acid
- C** Asid lemak
Fatty acid
- D** Vitamin B
Vitamin B

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6. Persamaan di bawah menunjukkan tindak balas pembentukan dipeptida.

The following equation shows a reaction of the formation of dipeptides.



Apakah proses L?

What is process L?

A Hidrolisis

Hydrolysis

B Katabolisme

Catabolism

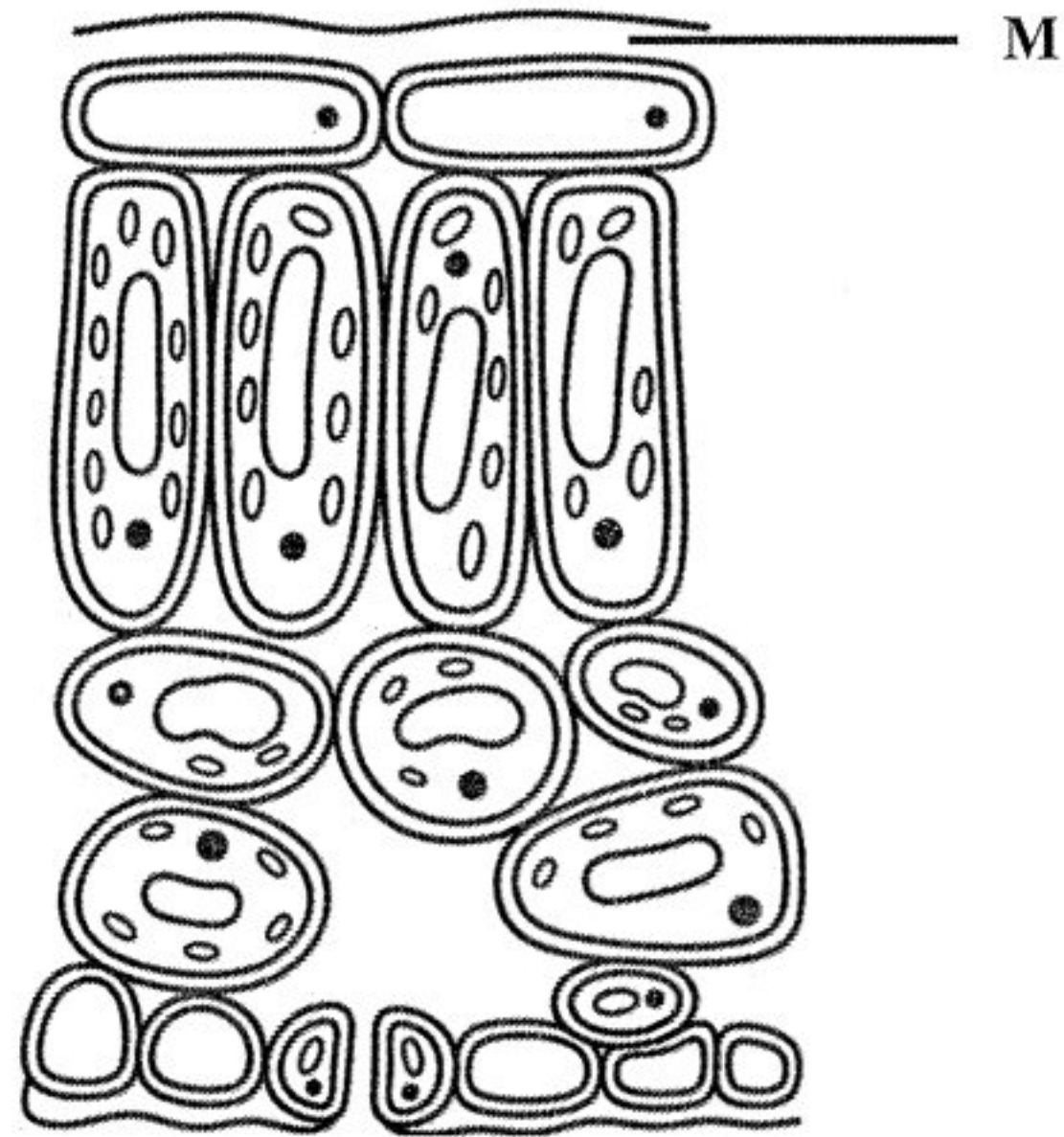
C Kondensasi

Condensation

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7. Rajah 4 menunjukkan keratan rentas daun.

Diagram 4 shows a cross section of a leaf.



Rajah 4
Diagram 4

Apakah unsur yang membentuk struktur M?

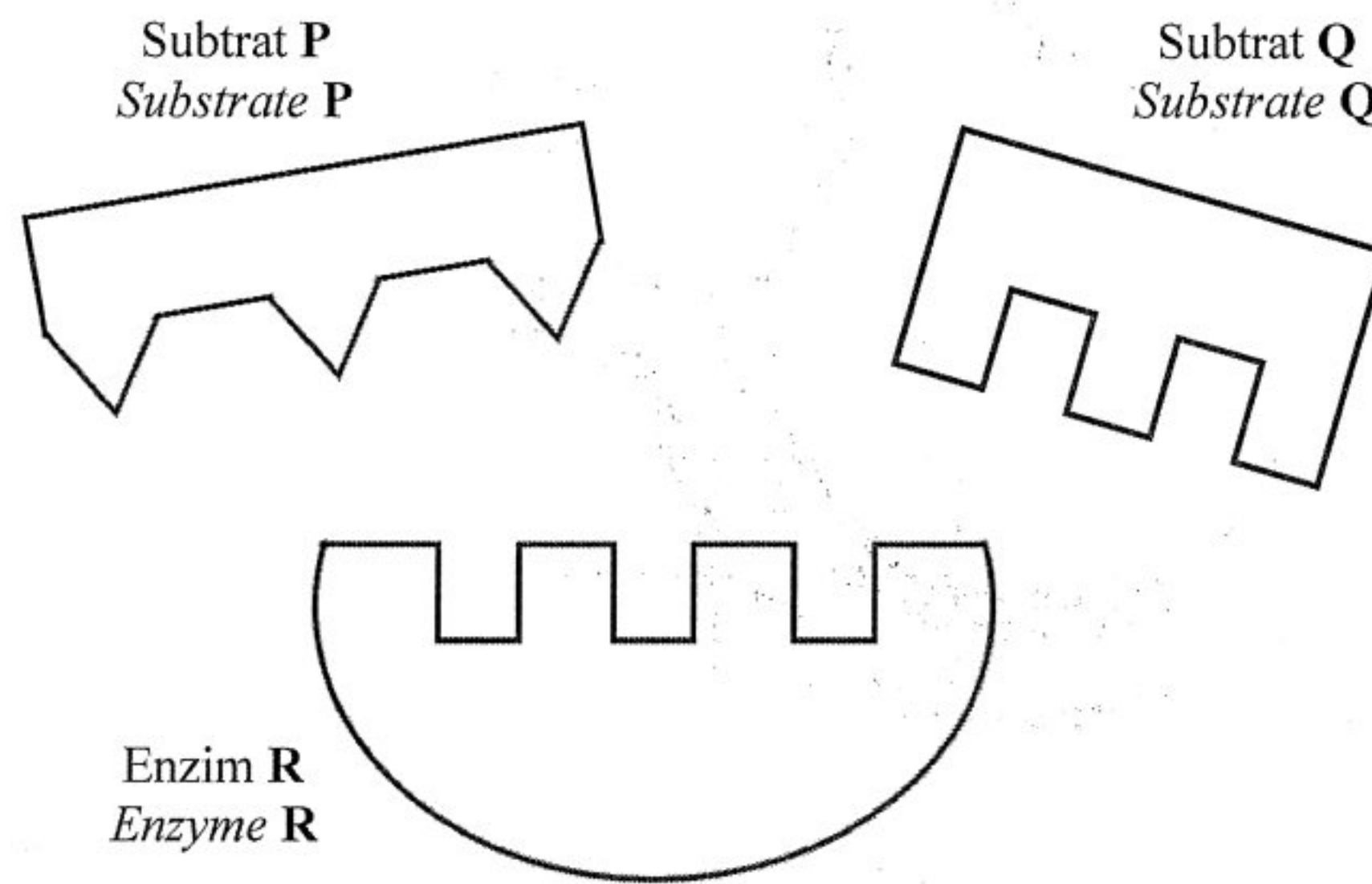
What are the elements that form structure M?

- A Karbon, hidrogen dan oksigen
Carbon, hydrogen and oxygen
- B Karbon, hidrogen dan nitrogen
Carbon, hydrogen and nitrogen
- C Hidrogen, oksigen dan nitrogen
Hydrogen, oxygen and nitrogen
- D Karbon, oksigen dan nitrogen
Carbon, oxygen and nitrogen

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8. Rajah 5 menunjukkan mekanisme tindakan enzim.

Diagram 5 shows the mechanism of enzyme action.



Rajah 5
Diagram 5

Apakah ciri yang ditunjukkan oleh enzim R?

What is the characteristic shown by enzyme R?

- A Tindak balas enzim adalah spesifik
Enzyme reaction is specific
- B Enzim diperlukan dalam kuantiti yang kecil
Enzyme needed in small quantity
- C Tindak balas enzim adalah berbalik
Enzyme reaction is reversible
- D Enzim boleh diguna semula
Enzyme can be reused

9. Nanas MD2 merupakan baka nanas yang menghasilkan buah yang sangat manis dan tinggi kandungan Vitamin C. Walau bagaimanapun, kekurangan benih yang berkualiti tinggi menyukarkan penanamannya secara komersial.

Apakah teknik terbaik yang boleh digunakan untuk mengatasi masalah tersebut?

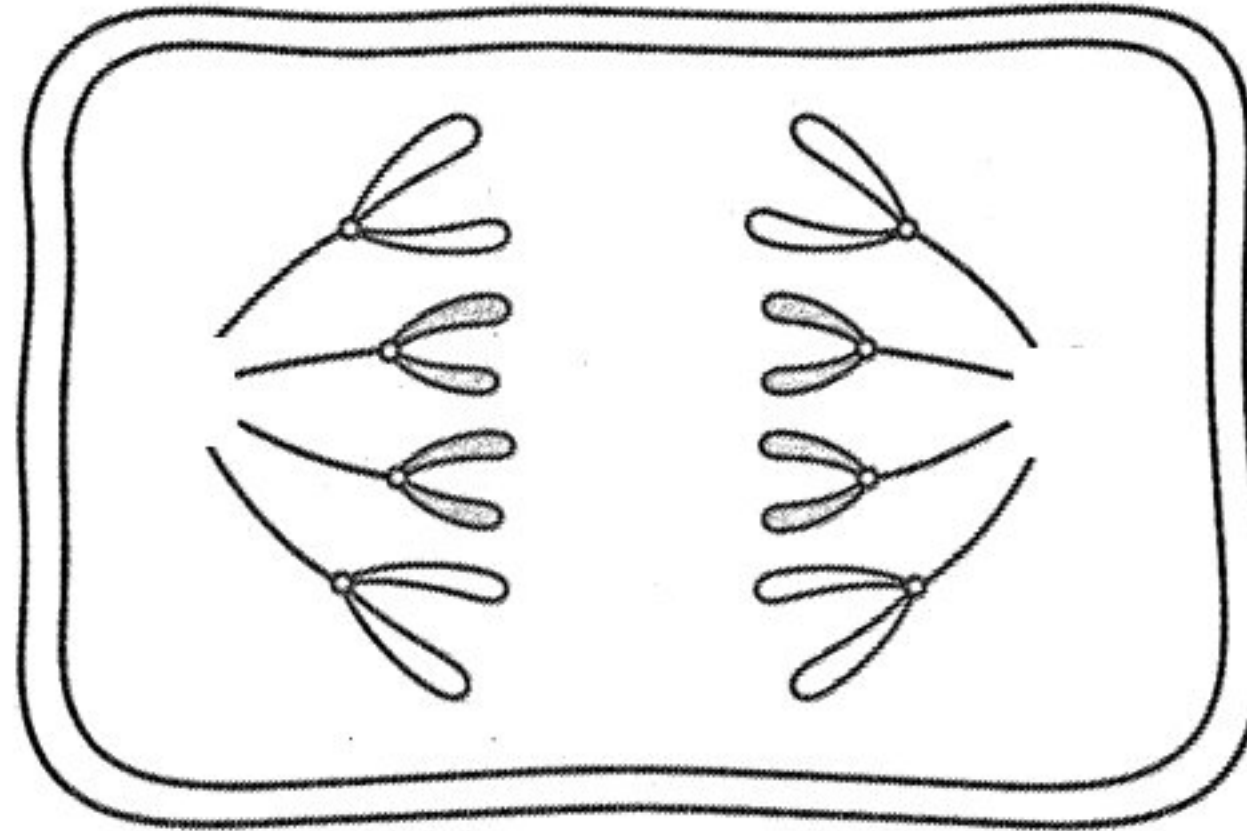
MD2 pineapple is a pineapple variety that produces fruits that are very sweet and high Vitamin C content. However, the lack of high-quality seeds limits the commercial cultivation of the pineapple.

What is the best technique that can be used to overcome the problem?

- A Terapi gen
Gene therapy
- B Kultur tisu
Tissue culture
- C Partenokarpi
Parthenocarpy
- D Kejuruteraan genetik
Genetic engineering

10. Rajah 6 menunjukkan perlakuan kromosom di dalam sel tumbuhan semasa mitosis.

Diagram 6 shows chromosomal behavior in the plant cell during mitosis.



Rajah 6
Diagram 6

Apakah fasa yang ditunjukkan?

What is the phase shown?

A Profasa

Prophase

B Metafasa

Metaphase

C Anafasa

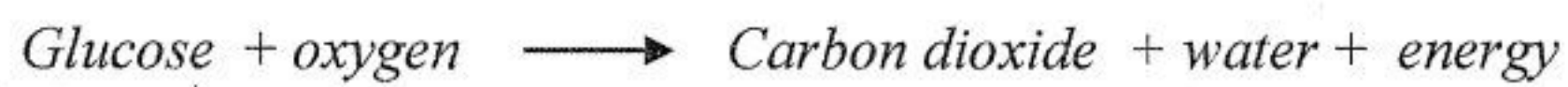
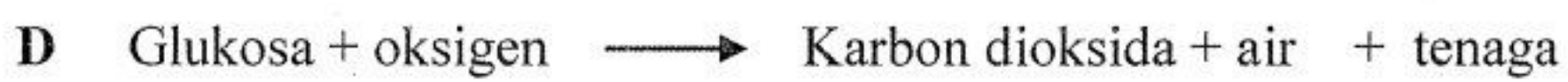
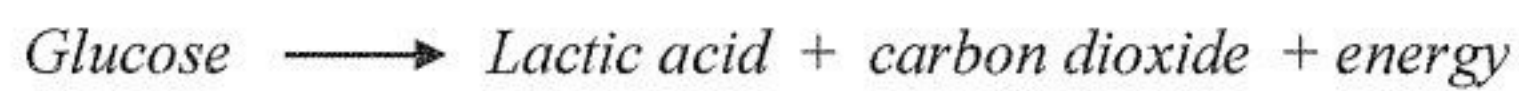
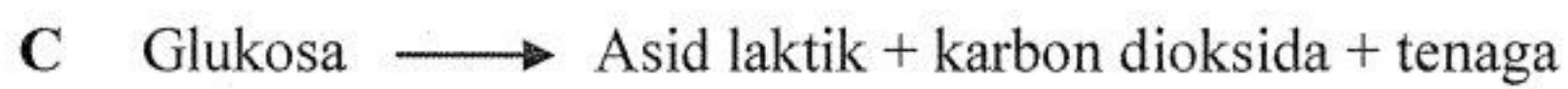
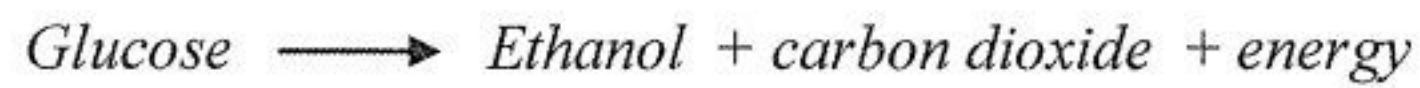
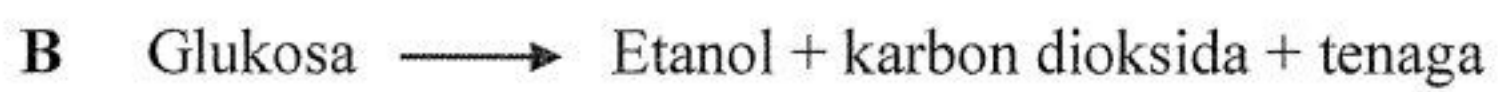
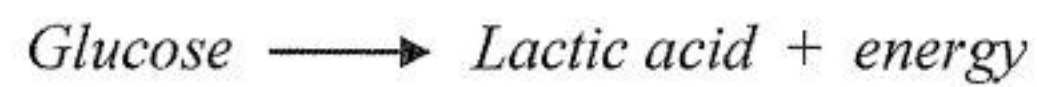
Anaphase

D Telofasa

Telophase

11. Antara berikut, persamaan manakah yang mewakili proses respirasi yang dijalankan oleh *Lactobacillus* sp. semasa penghasilan minuman kultur probiotik?

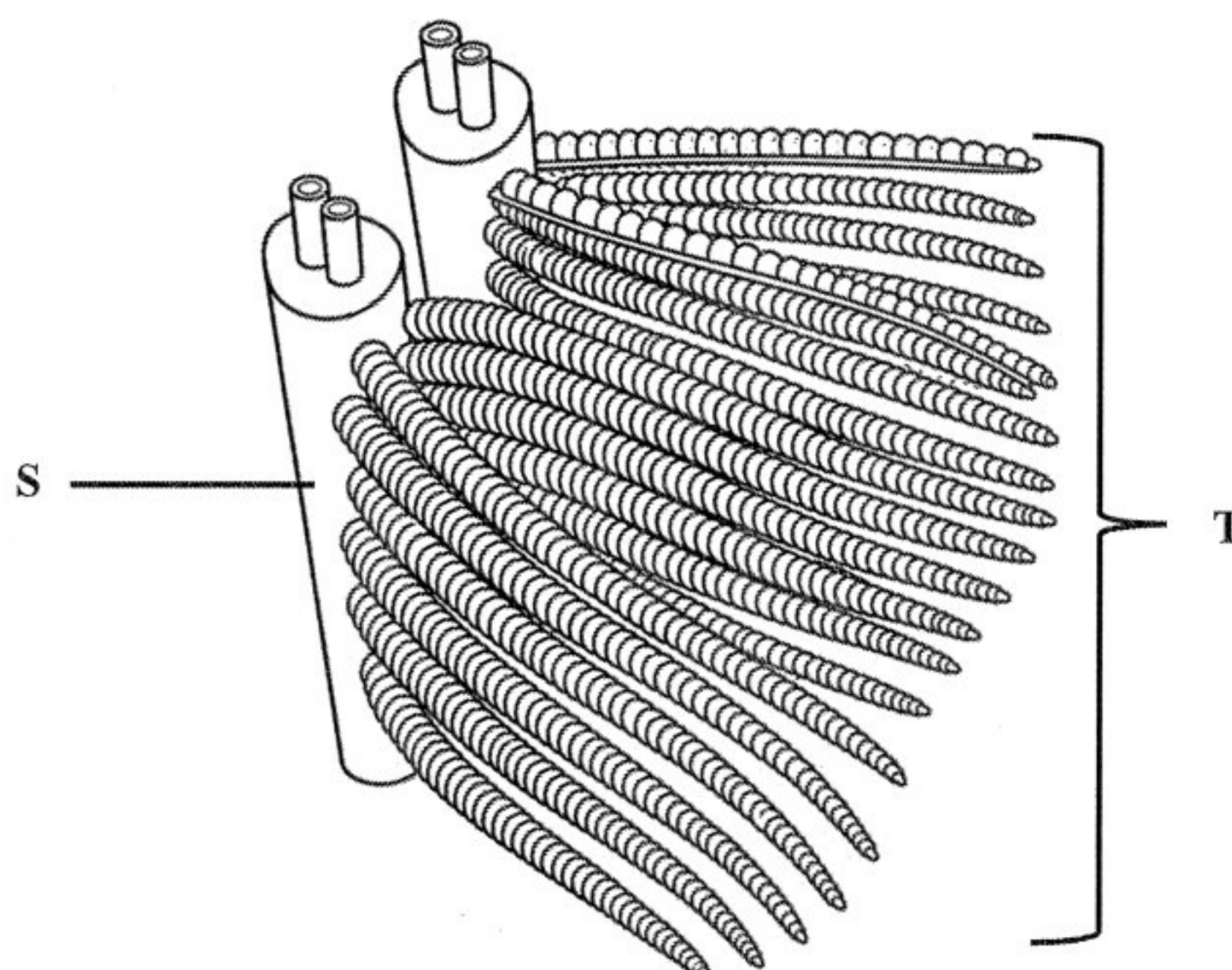
Which of the following equations represent the respiration process carried out by Lactobacillus sp. during the production of the probiotic cultured drink?



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12. Rajah 7 menunjukkan struktur respirasi ikan.

Diagram 7 shows a fish respiratory structure.



Rajah 7
Diagram 7

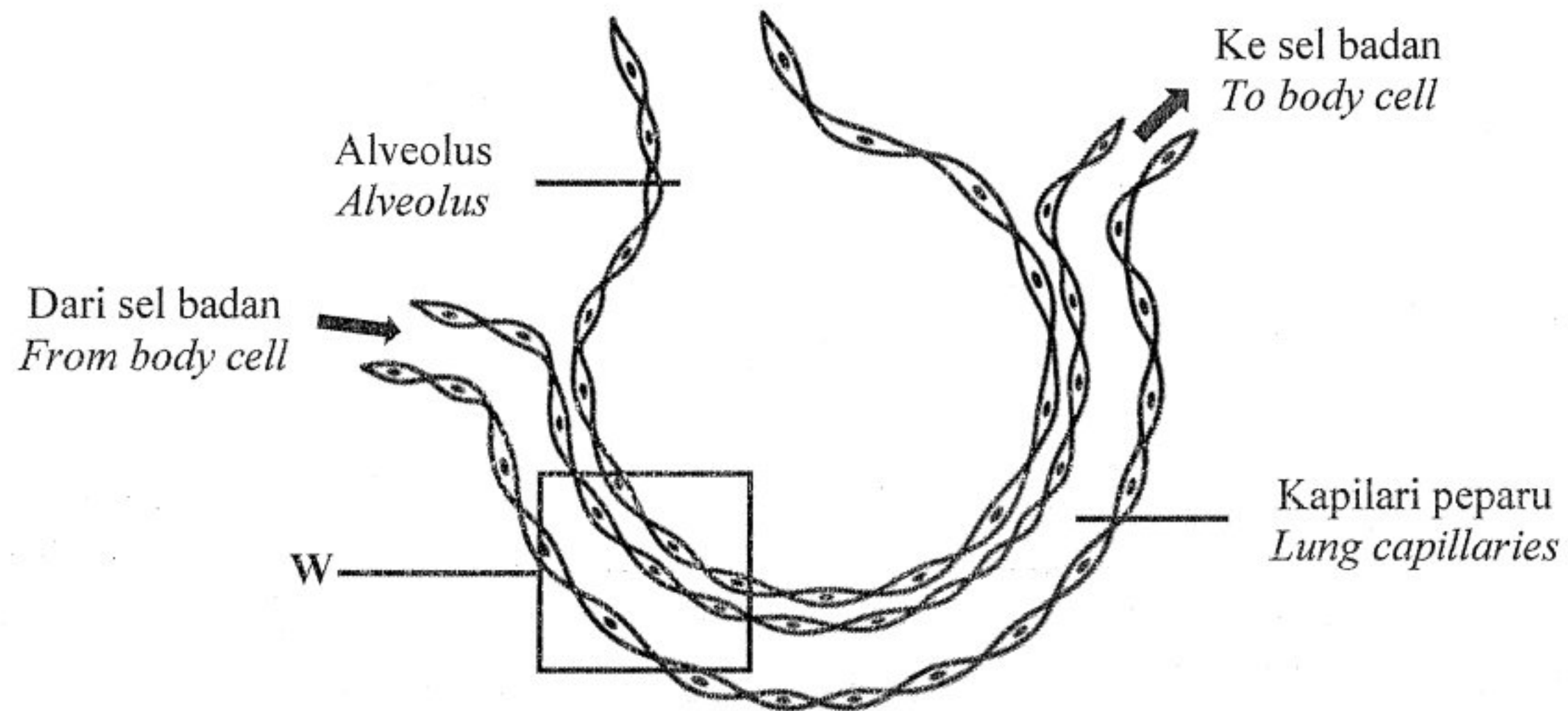
Antara yang berikut, yang manakah mewakili S dan T?

Which of the following represent S and T?

	S	T
A	Lengkung insang <i>Gill arch</i>	Lamela <i>Lamella</i>
B	Filamen insang <i>Gill filaments</i>	Lengkung insang <i>Gill arch</i>
C	Lamela <i>Lamella</i>	Filamen insang <i>Gill filaments</i>
D	Lengkung insang <i>Gill arch</i>	Filamen insang <i>Gill filaments</i>

13. Rajah 8 menunjukkan struktur respirasi manusia.

Diagram 8 shows the human respiratory structure.



Rajah 8
Diagram 8

Antara berikut, manakah betul mengenai pengangkutan karbon dioksida di W?

Which of the following is correct about the transport of carbon dioxide at W?

- I Penguraian asid karbonik kepada karbon dioksida dan air
Breakdown of carbonic acid into carbon dioxide and water
 - II Asid karbonik terurai kepada ion bikarbonat dan ion hidrogen
Carbonic acid breakdown into bicarbonate ion and hydrogen ion
 - III Ion bikarbonat meresap ke dalam plasma darah
Bicarbonate ion diffuse into blood plasma
 - IV Karbon dioksida meresap keluar melalui kapilari paru ke alveolus
Carbon dioxide diffuses out through lung capillaries to alveolus
- A I dan II
I and II
- B I dan IV
I and IV
- C II dan III
II and III
- D III dan IV
III and IV

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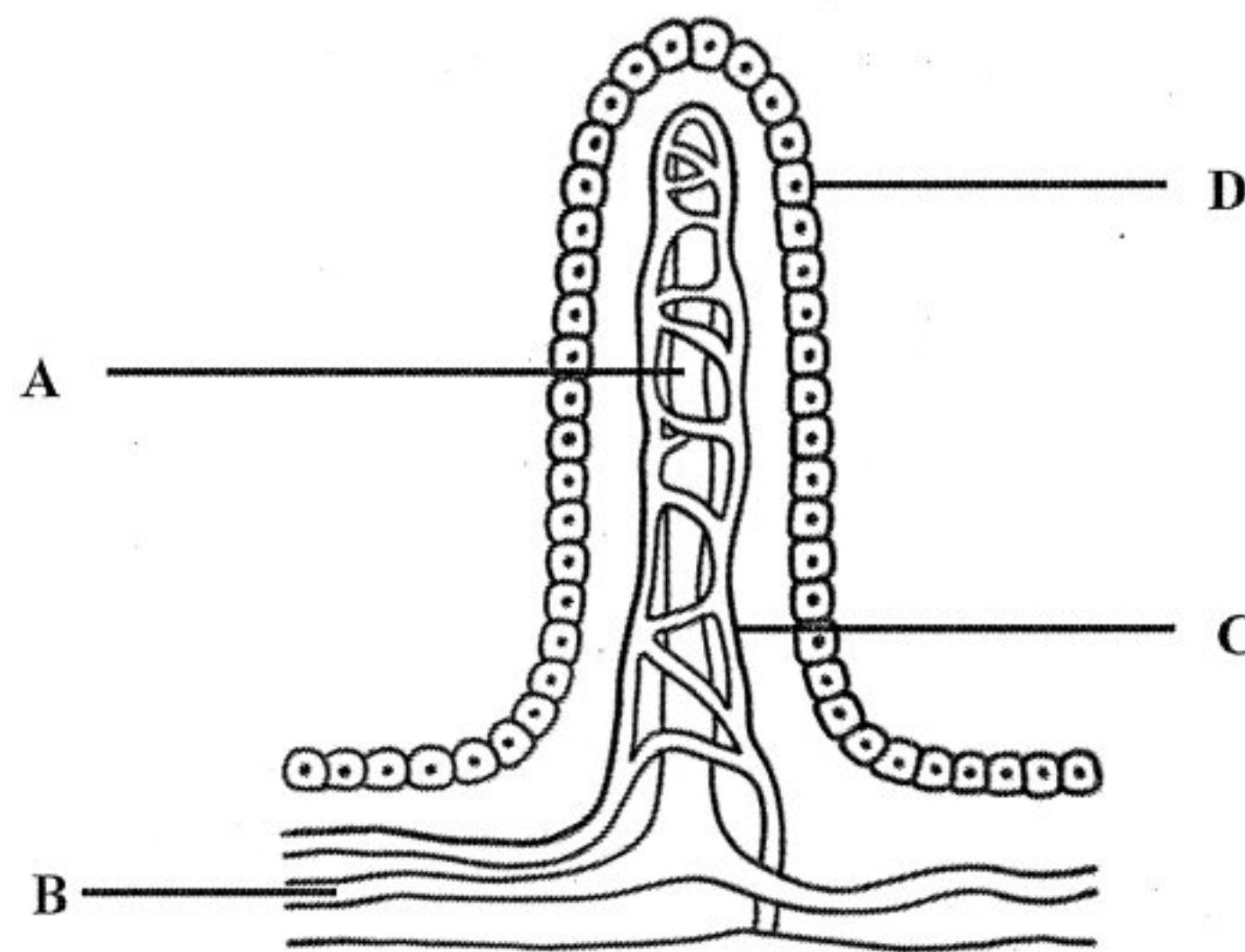
14. Antara berikut, menu manakah yang sesuai diambil oleh individu yang menghidap penyakit aterosklerosis?

Which of the following menu is suitable to be taken by an individual with atherosclerosis?

- A Beras putih, ikan masin, sup sayur
White rice, salted fish, vegetable soup
- B Beras putih, daging bakar, kentang rebus
White rice, grilled meat, boiled potatoes
- C Beras perang, sayuran, ikan stim
Brown rice, vegetables, steamed fish
- D Beras perang, ayam goreng, jus buah
Brown rice, fried chicken, fruit juice

15. Rajah 9 menunjukkan struktur vilus pada dinding usus kecil.

Diagram 9 shows a structure of villus on small intestine wall.



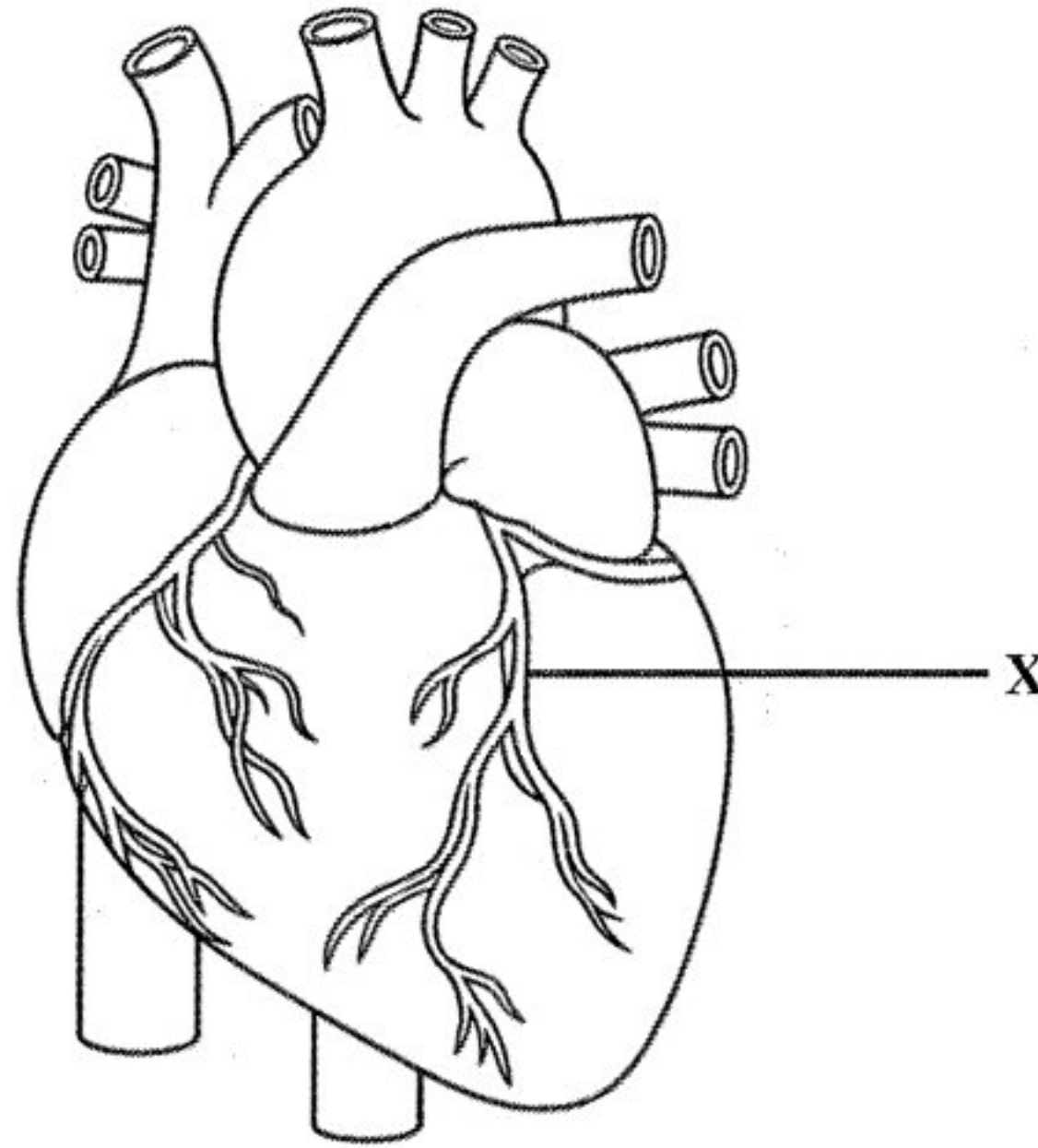
Rajah 9
Diagram 9

Antara struktur A, B, C dan D manakah lakteal?

Which of the structure A, B, C and D is lacteal?

16. Rajah 10 menunjukkan struktur jantung manusia.

Diagram 10 shows the structure of a human heart.



Rajah 10
Diagram 10

Apakah struktur X?

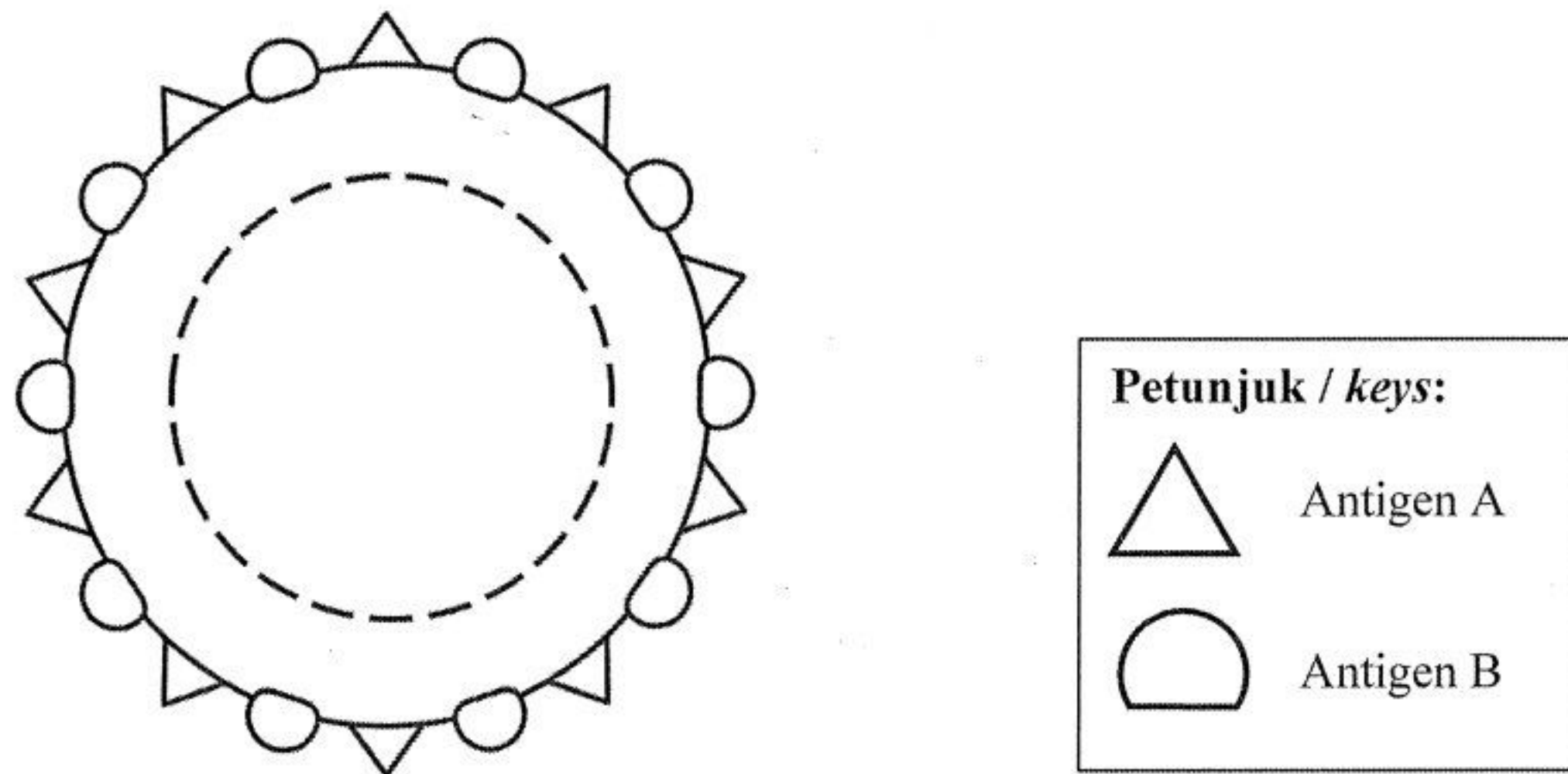
What is structure X?

- A Arteri pulmonari
Pulmonary artery
- B Vena pulmonari
Pulmonary vein
- C Arteri koronari
Coronary artery
- D Arteri karotid
Carotid artery

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17. Rajah 11 menunjukkan antigen pada permukaan eritrosit.

Diagram 11 shows the antigens on the surface of erythrocyte.



Rajah 11
Diagram 11

Apakah kumpulan darah tersebut?

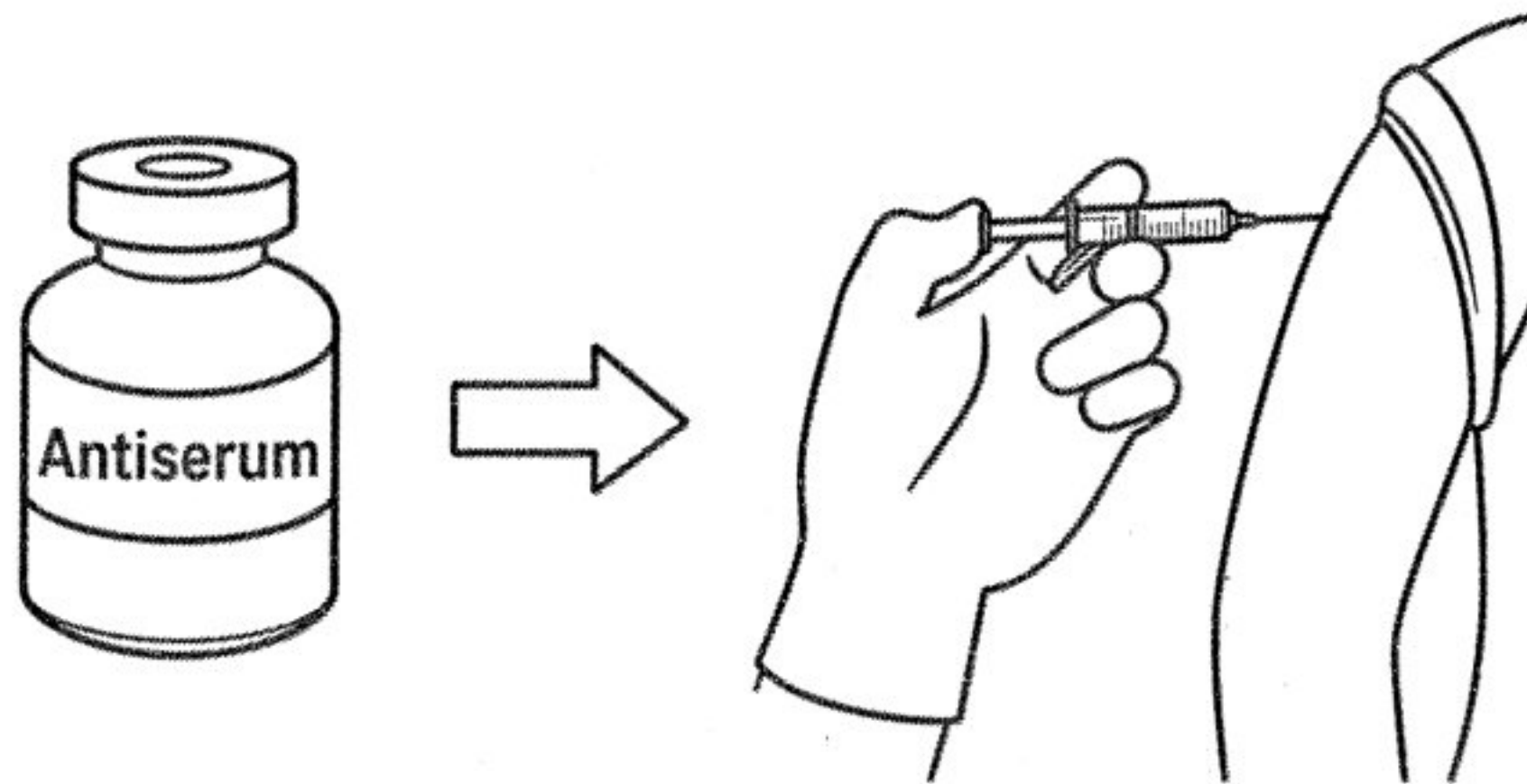
What is the blood group?

- A Kumpulan darah O
Blood group O
- B Kumpulan darah A
Blood group A
- C Kumpulan darah B
Blood group B
- D Kumpulan darah AB
Blood group AB

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18. Rajah 12 menunjukkan seorang individu menerima suntikan.

Diagram 12 shows an individual receiving an injection.



Rajah 12
Diagram 12

Apakah kepentingan suntikan tersebut?

What is the importance of the injection?

- A** Mengaktifkan sel memori
Activates memory cells
- B** Merangsang limfosit menghasilkan antibodi
Stimulates lymphocytes to produce antibodies
- C** Memberi keimunan untuk jangka masa yang lama
Provides immunity for a long term
- D** Memberi perlindungan segera
Gives immediate protection

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19. Rajah 13 menunjukkan seorang individu dalam dua situasi berbeza.

Diagram 13 shows an individual in two different situations.



Situasi Y
Situation Y



Situasi Z
Situation Z

Rajah 13
Diagram 13

Antara berikut, manakah betul tentang situasi tersebut?

Which of the following is correct about the situation?

	Situasi Y <i>Situation Y</i>	Situasi Z <i>Situation Z</i>
A	Melibatkan sistem saraf autonomi <i>Involves autonomic nervous system</i>	Melibatkan sistem saraf soma <i>Involves somatic nervous system</i>
B	Tindakan dilakukan mengikut kehendak individu <i>Actions carried out according to individual wishes</i>	Tindakan berlaku secara automatik <i>Actions happen automatically</i>
C	Dikawal oleh korteks serebrum <i>Regulated by cerebral cortex</i>	Dikawal oleh medula oblongata dan hipotalamus <i>Regulated by medulla oblongata and hypothalamus</i>
D	Melibatkan gerak balas otot rangka <i>Involves skeletal muscle response</i>	Melibatkan gerak balas otot licin dan kelenjar <i>Involves smooth muscle and glands</i>

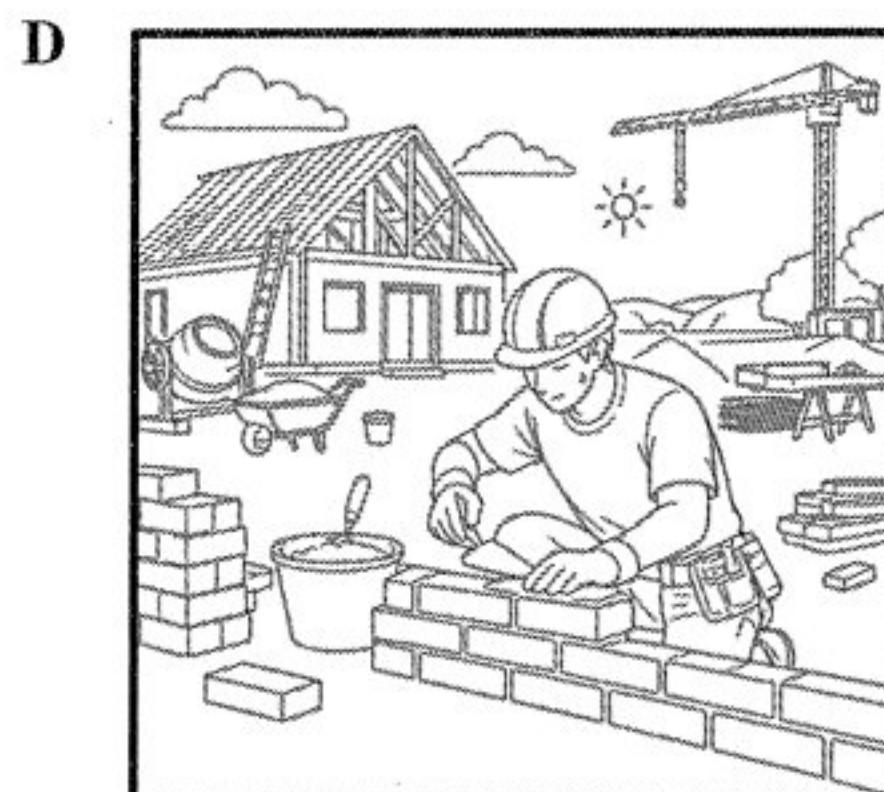
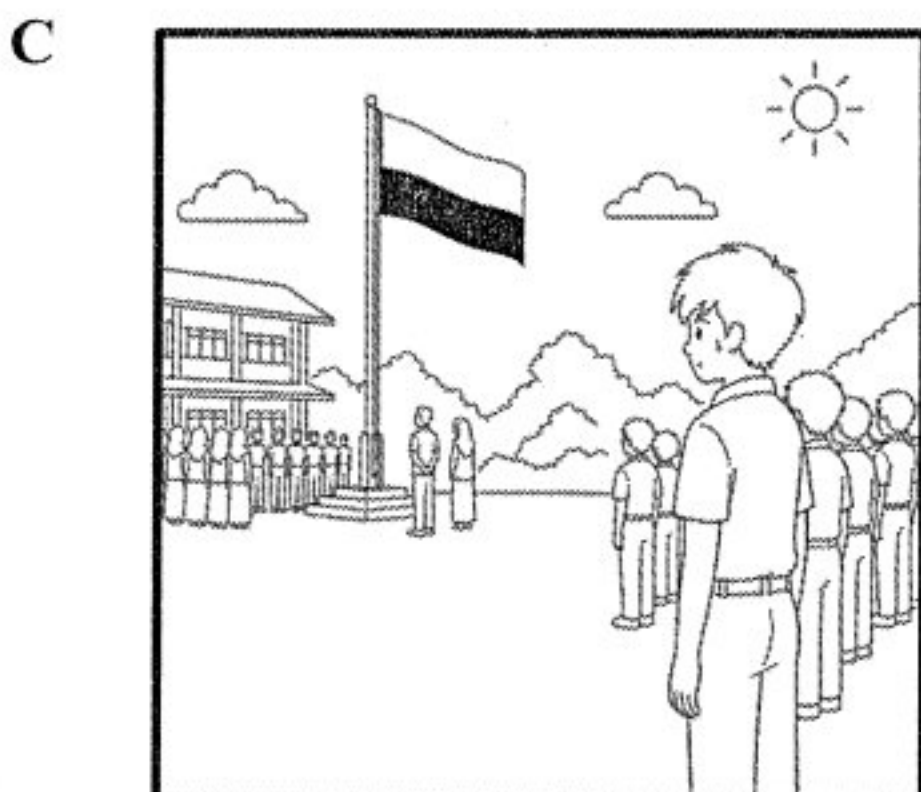
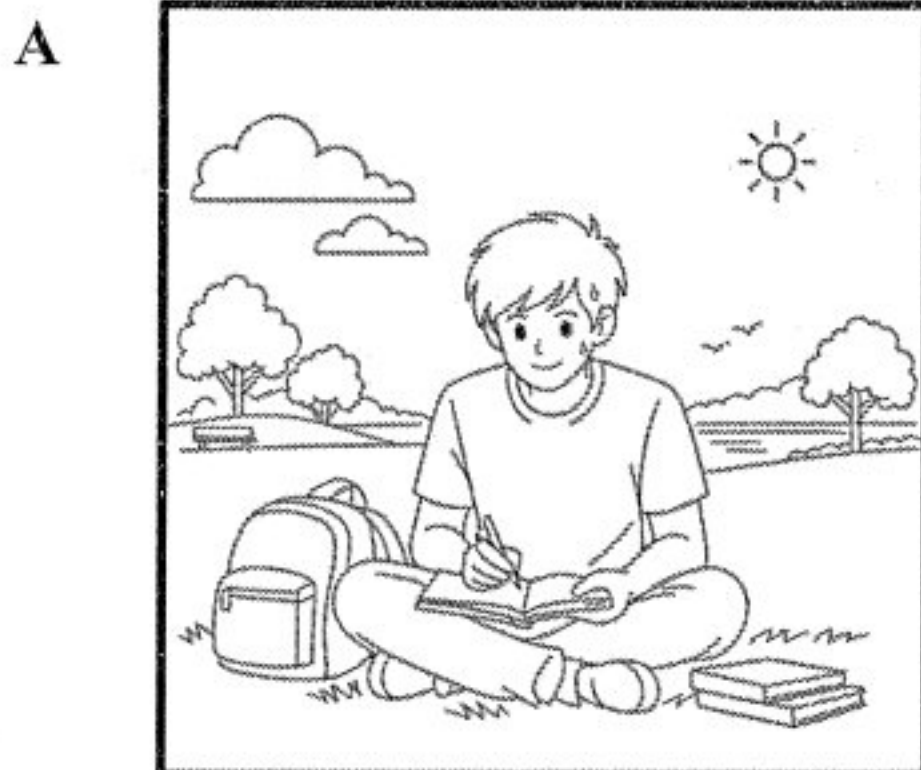
20. Antara yang berikut, hormon manakah yang kurang dirembeskan oleh pesakit diabetes insipidus?

Which of the following hormones is less secreted by a diabetes insipidus patient?

- A Hormon antidiuresis
Antidiuretic hormone
- B Tiroksina
Thyroxine
- C Adrenalina
Adrenaline
- D Insulin
Insulin

21. Antara berikut, aktiviti manakah yang menyebabkan dinding duktus pengumpul menjadi kurang telap kepada air?

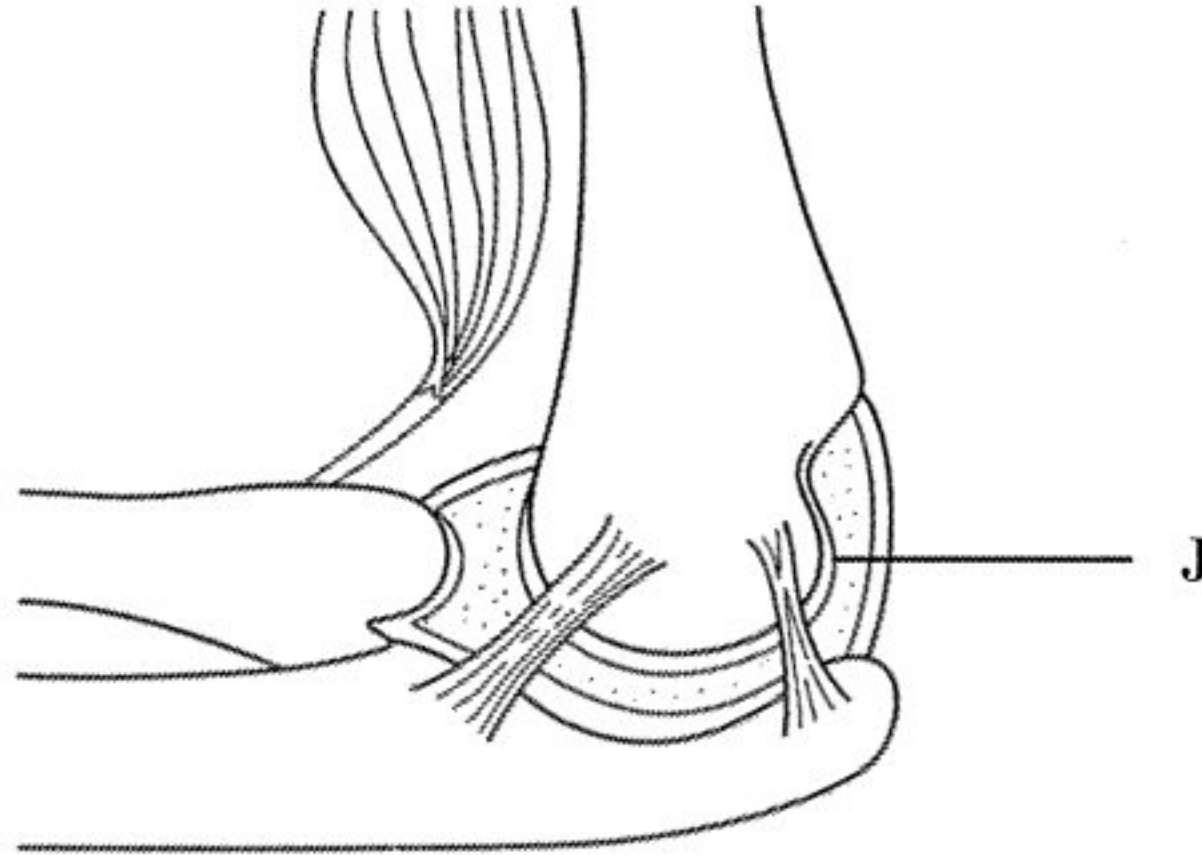
Which of the following activities cause the walls of collecting duct become less permeable to water?



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22. Rajah 14 menunjukkan struktur sendi seorang individu.

Diagram 14 shows the joint structure of an individual.



Rajah 14
Diagram 14

Apakah struktur J?

What is structure J?

- A Tendon
Tendon
- B Rawan
Cartilage
- C Ligamen
Ligament
- D Membran sinovia
Synovial membrane

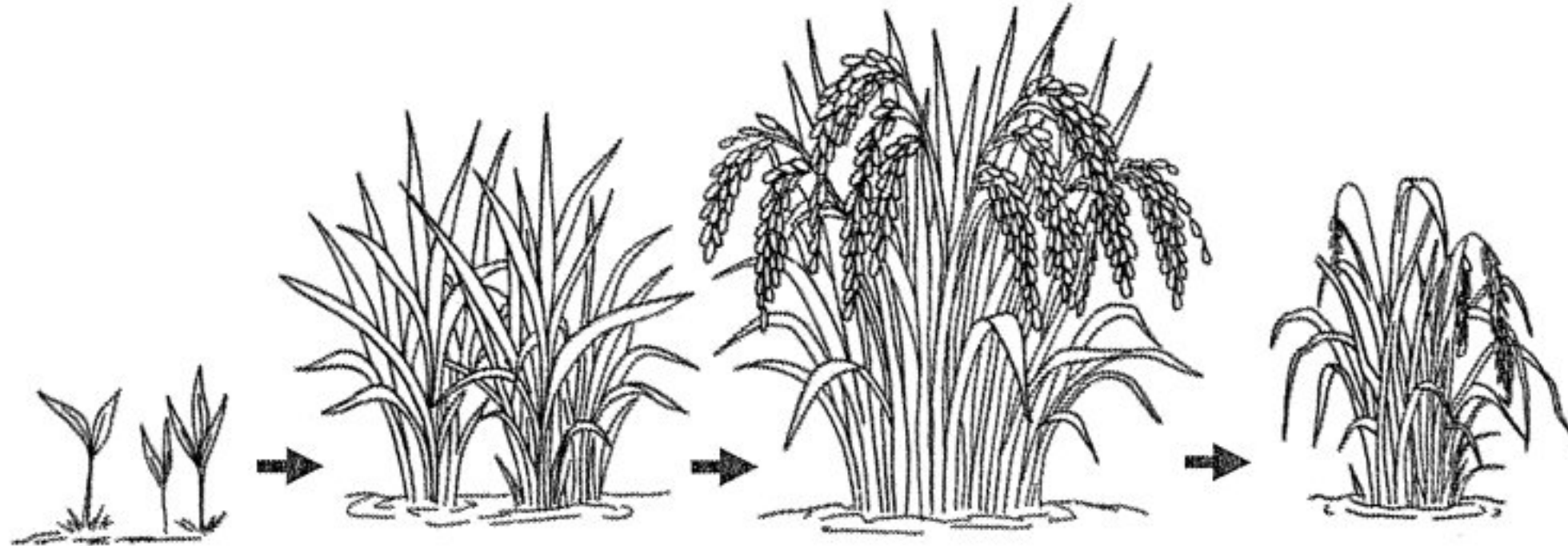
23. Antara punca kemandulan berikut, yang manakah boleh dirawat melalui pembedahan?

Which of the following causes of infertility can be treated through surgery?

- A Bilangan sperma kurang
Low sperm count
- B Ketidakseimbangan hormon
Hormonal imbalance
- C Testis tidak menghasilkan sperma
Testes do not produce sperm
- D Saluran duktus sperma tersumbat
Blockage of sperm duct

24. Rajah 15 menunjukkan pertumbuhan sejenis pokok.

Diagram 15 shows the growth of a plant.

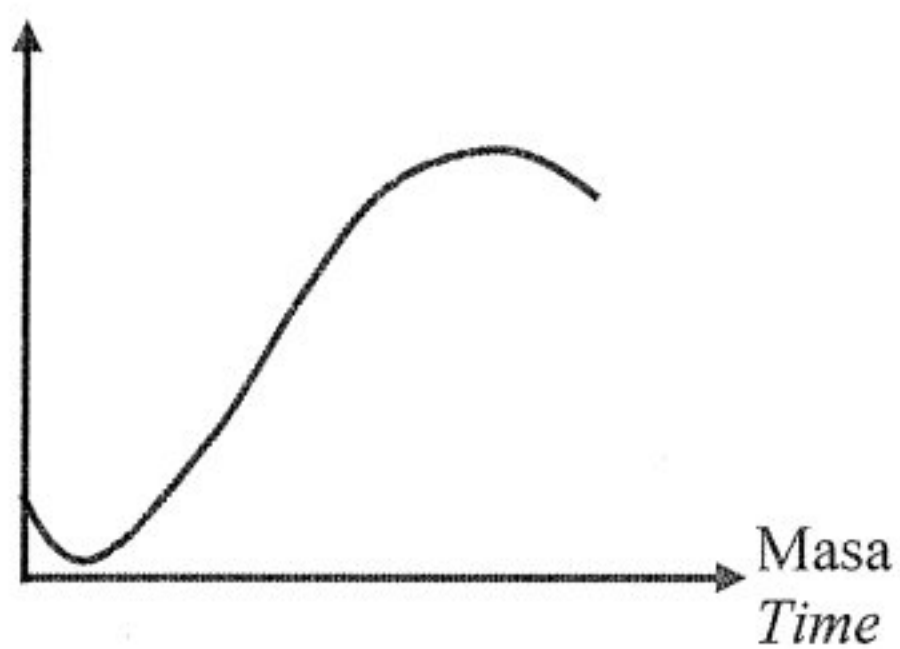


Rajah 15
Diagram 15

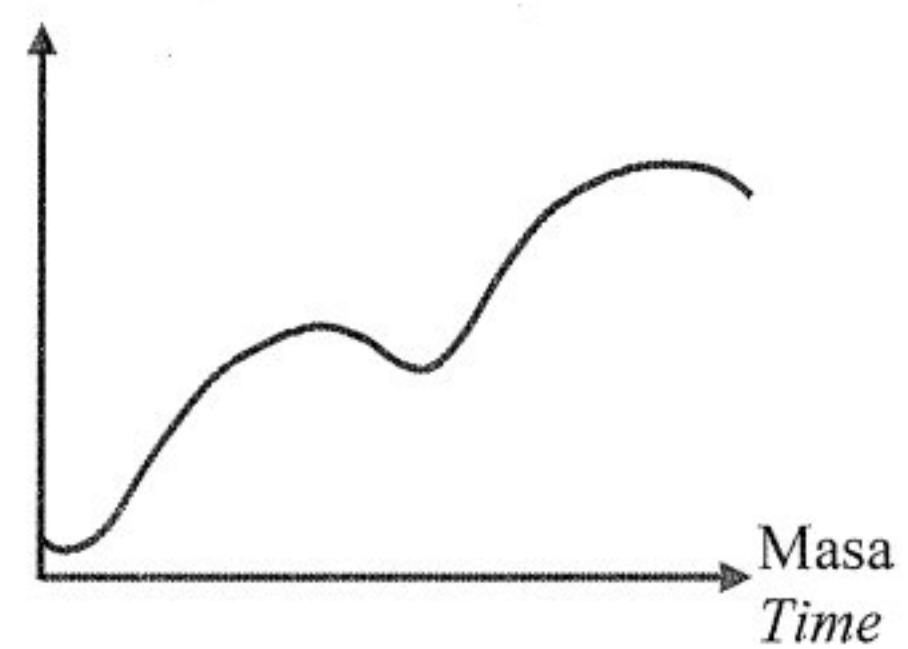
Antara berikut, yang manakah lengkung pertumbuhan pokok tersebut?

Which of the following is the growth curve for the plant?

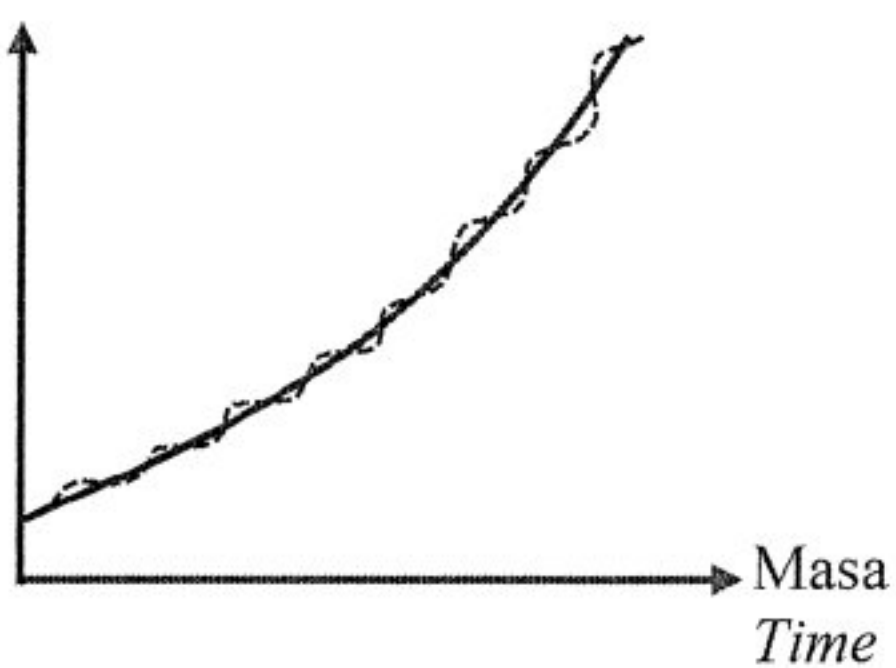
A Pertumbuhan
Growth



B Pertumbuhan
Growth



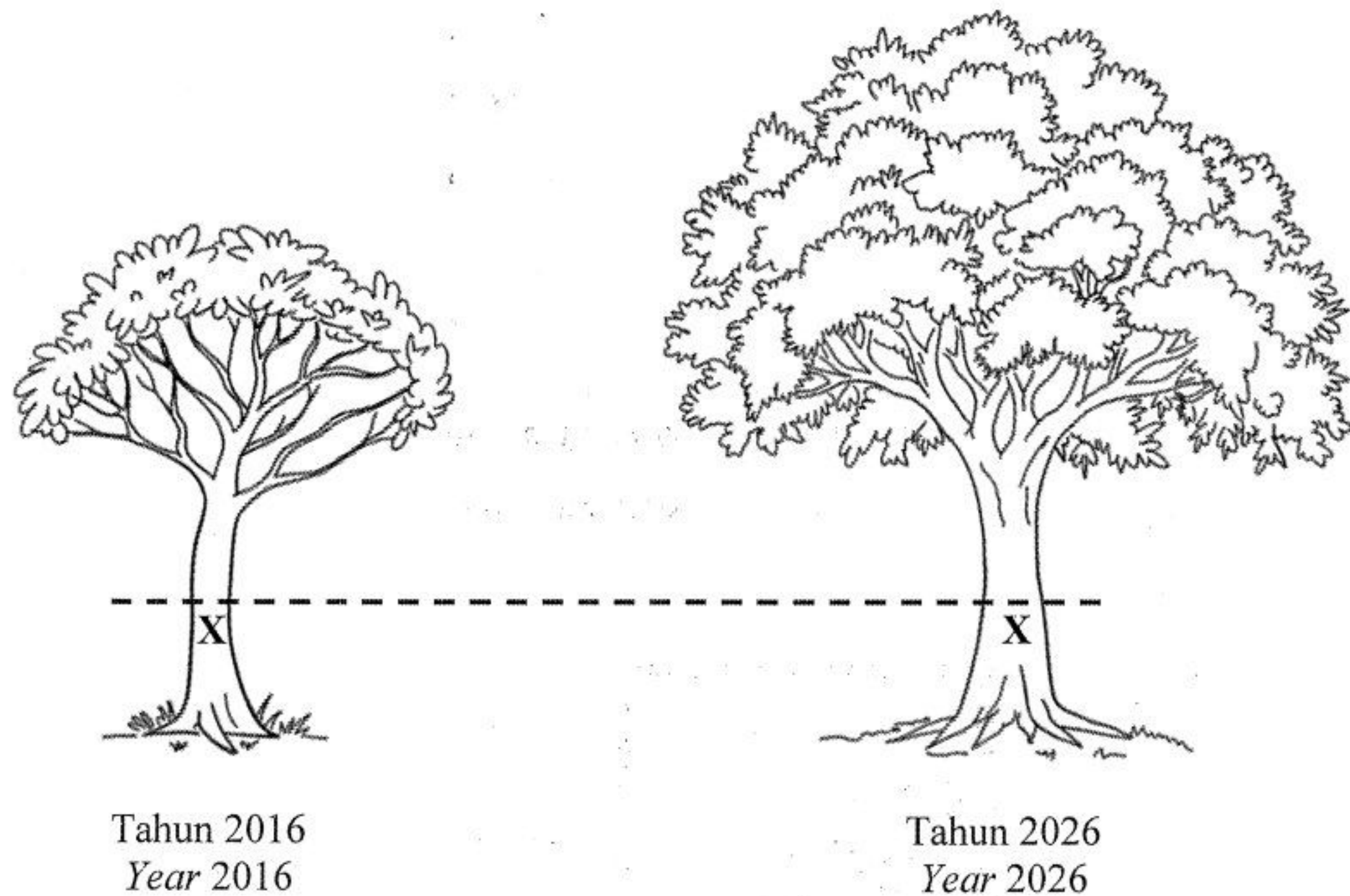
C Pertumbuhan
Growth



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25. Rajah 16 menunjukkan sebatang pokok yang telah ditandakan dengan X pada tahun 2016. Selepas 10 tahun, didapati kedudukan X pada pokok tersebut kekal pada ketinggian yang sama.

Diagram 16 shows a tree marked with X in the year 2016. After 10 years, it is found that the position of X on the tree remains at the same height.



Rajah 16
Diagram 16

Antara berikut, yang manakah menyebabkan kedudukan X kekal?

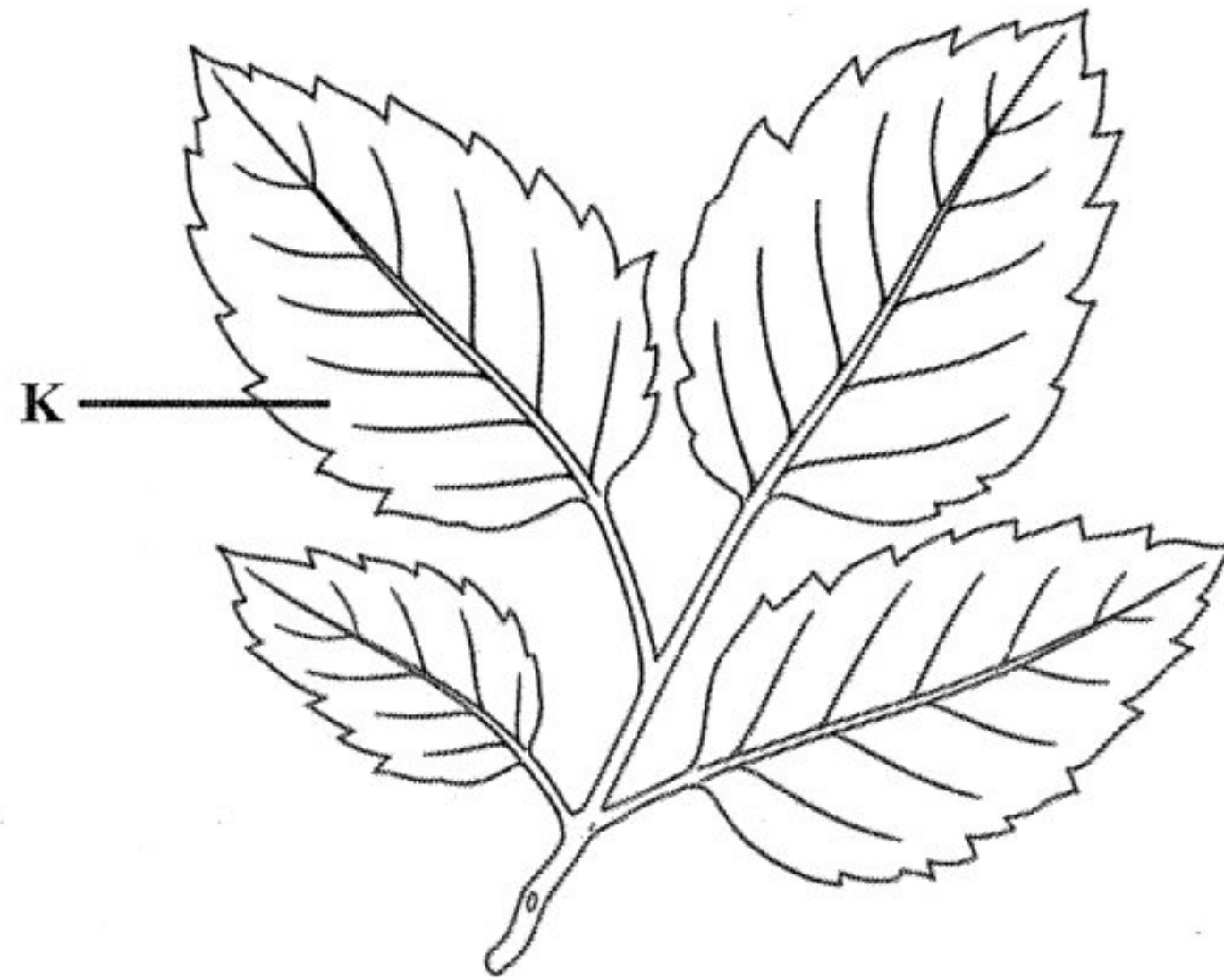
Which of the following causes the position of X to remain?

- A Tanda X menghalang pembahagian dan pemanjangan tisu kekal
The X mark obstructs the division and elongation of permanent tissue
- B Pertumbuhan primer hanya berlaku di meristem apeks pada hujung pucuk
Primary growth only occurs at the apical meristems of the shoot tips
- C Sel-sel pada bahagian batang telah menjadi tisu kekal dan tidak lagi memanjang
The cells in the stem have become permanent tissues and are no longer elongate
- D Pertumbuhan sekunder pada meristem lateral menyebabkan pertambahan ukur lilit batang pokok
Secondary growth at lateral meristem causes an increase in the circumference of the stem

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26. Rajah 17 menunjukkan struktur luar daun.

Diagram 17 shows the external structure of leaves.



Rajah 17
Diagram 17

What is **K**?

Apakah K?

A Lamina

Lamina

B Petiol

Petiole

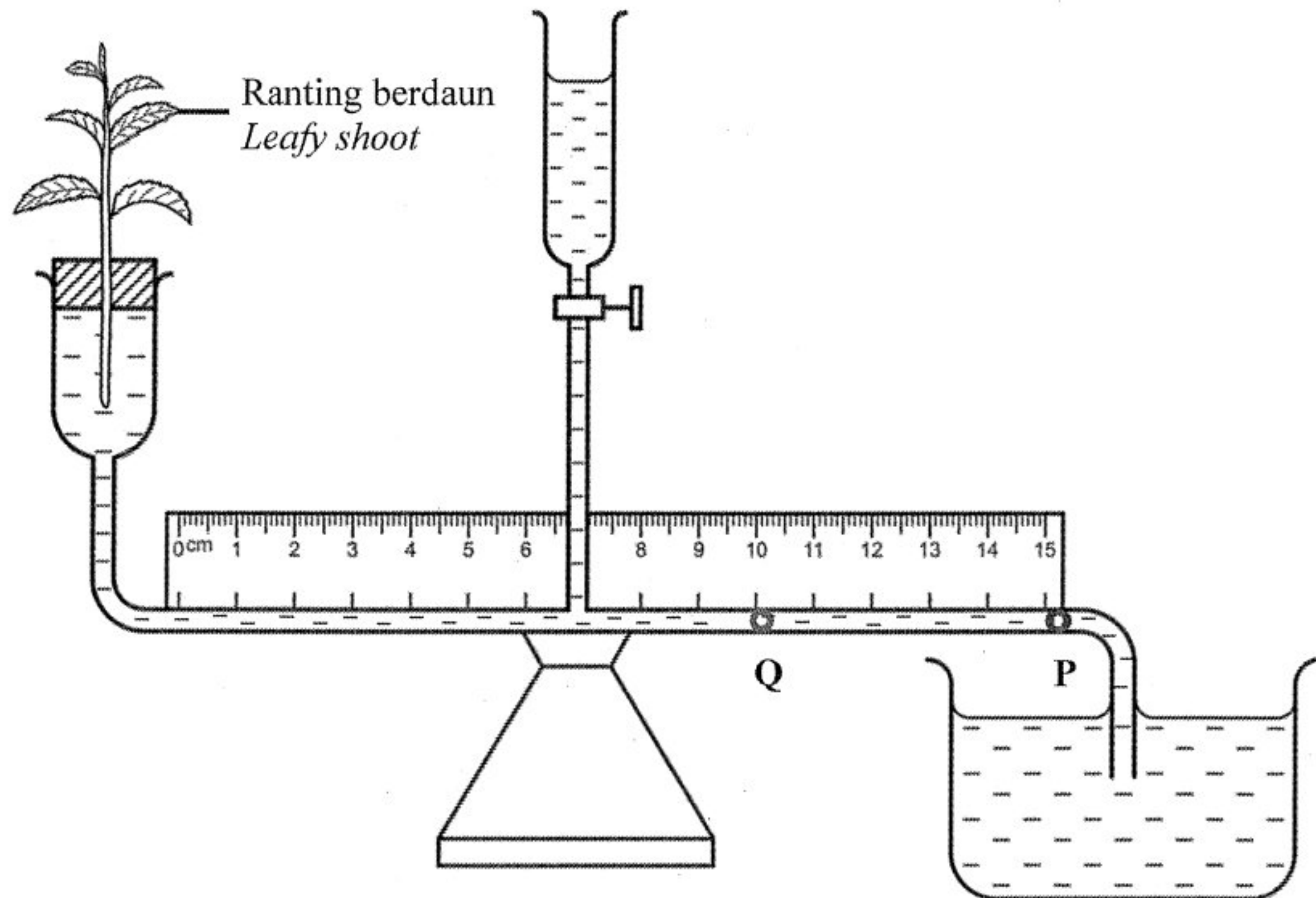
C Urat daun

Leaf vein

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27. Rajah 18 menunjukkan susunan radas potometer.

Diagram 18 shows the arrangement of the potometer apparatus.



Rajah 18
Diagram 18

Antara berikut, keadaan persekitaran manakah yang akan menyebabkan pergerakan gelembung udara dari P ke Q paling cepat?

Which of the following environmental conditions will cause the movement of air bubble from P to Q the fastest?

- A Di dalam almari yang gelap
In a dark cupboard
- B Di bawah kipas angin berkelajuan tinggi
Under the highspeed fan
- C Di dalam bilik bersuhu 20 °C
In a room with temperature of 20 °C
- D Ranting berdaun dibungkus dengan beg plastik
The leafy shoot is wrapped in a plastic bag

28. Seorang petani mendapati pertumbuhan pokok cili terbantut dan seluruh daun menjadi kuning.

Antara berikut, manakah tindakan yang perlu dilakukan untuk mengatasi masalah tersebut?

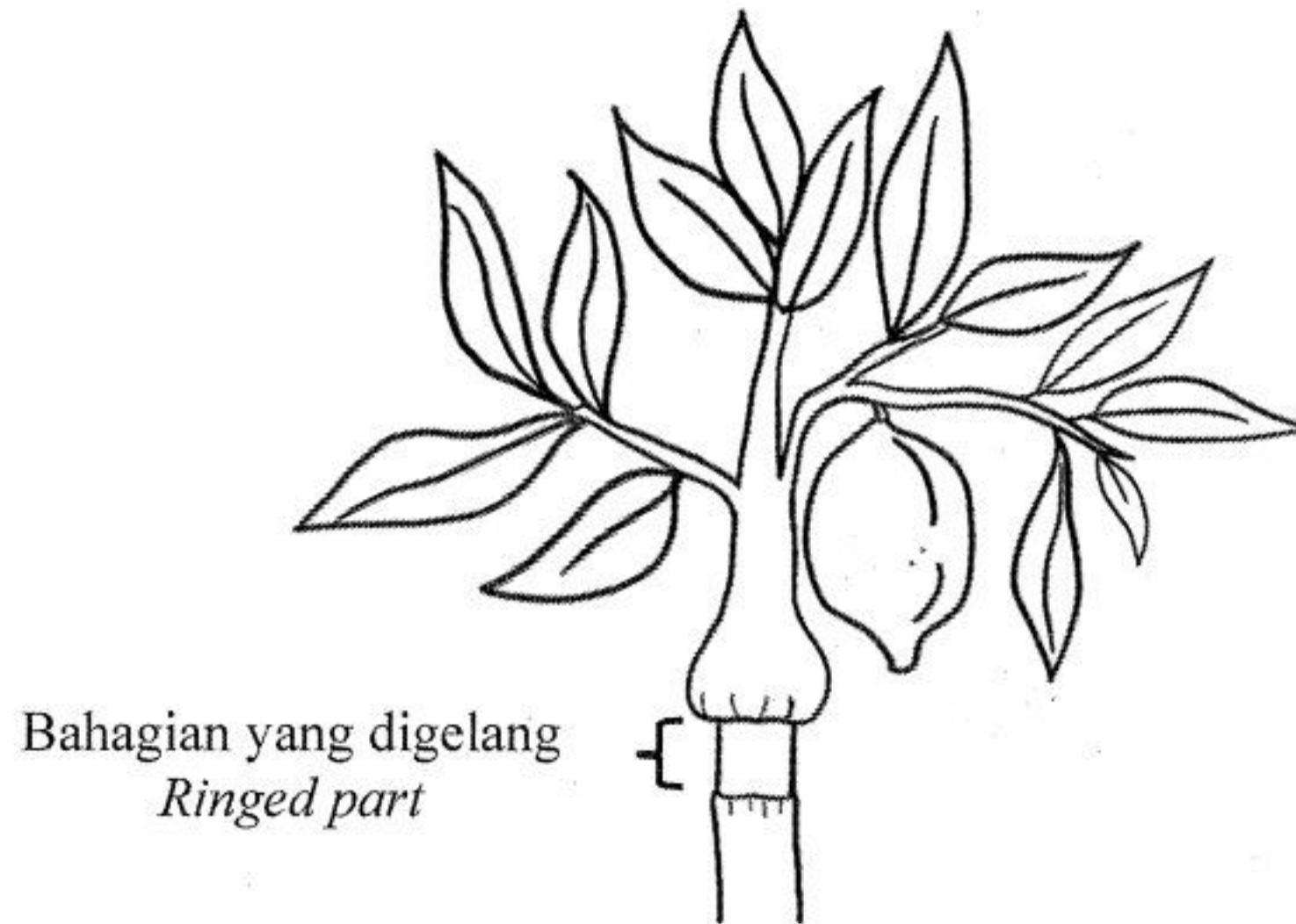
A farmer found that the growth of the chilli plant was stunted and the whole leaf becomes yellow.

Which of the following actions need to be taken to overcome the problem?

- A Siram pokok dengan lebih kerap
Water the plant frequently
- B Tambahkan baja yang mengandungi nitrogen
Add fertiliser containing nitrogen
- C Tambahkan baja yang mengandungi kalsium
Add fertiliser containing calcium
- D Memasang jaring pelindung matahari
Installing a sun protection net

29. Rajah 19 menunjukkan pemerhatian pada batang pokok selepas sebulan penggelangan dijalankan.

Diagram 19 shows the observation of a plant stem after a month of bark ringing.



Rajah 19
Diagram 19

Antara yang berikut, yang manakah menerangkan pemerhatian bahagian atas gelang tersebut?

Which of the following explain the observation of the upper part of the ring?

- A Xilem tidak dapat mengangkut sukrosa ke bahagian bawah pokok
Xylem is unable to transport sucrose to the lower part of the plant
- B Xilem tidak dapat mengangkut air ke bahagian bawah pokok
Xylem is unable to transport water to the lower part of the plant
- C Floem tidak dapat mengangkut air ke bahagian bawah pokok
Phloem is unable to transport water to the lower part of the plant
- D Floem tidak dapat mengangkut sukrosa ke bahagian bawah pokok
Phloem is unable to transport sucrose to the lower part of the plant

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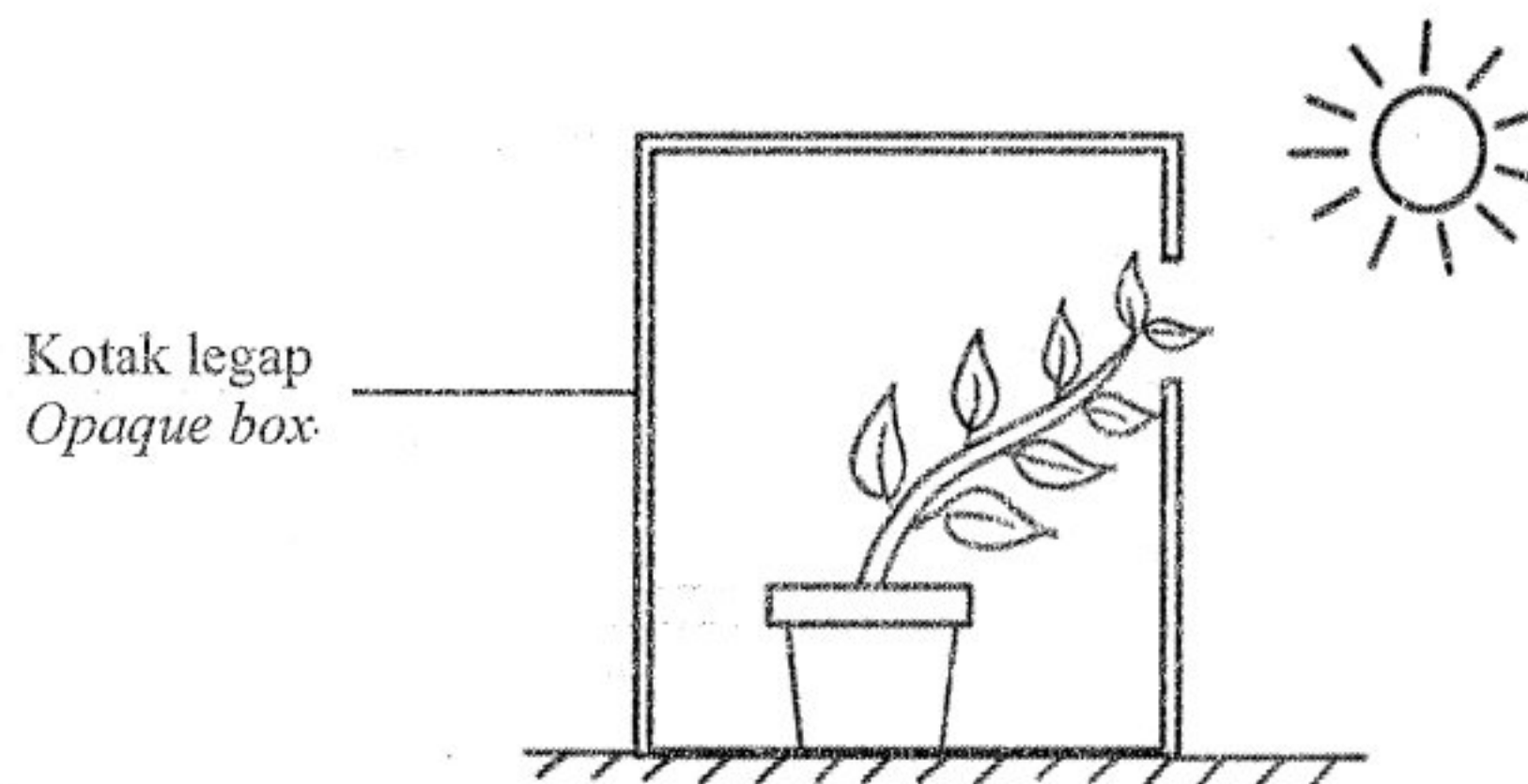
30. Antara berikut, yang manakah membantu pergerakan molekul air melawan tarikan graviti dalam batang pokok?

Which of the following assists the movement of water molecules against the gravitational pull in a tree stem?

- A Tarikan transpirasi
Transpiration pulls
- B Tindakan kapilari
Capillary action
- C Tekanan akar
Root pressure

31. Rajah 20 menunjukkan gerak balas tumbuhan.

Diagram 20 shows a plant response.



Rajah 20
Diagram 20

Apakah yang menyebabkan gerak balas tersebut?

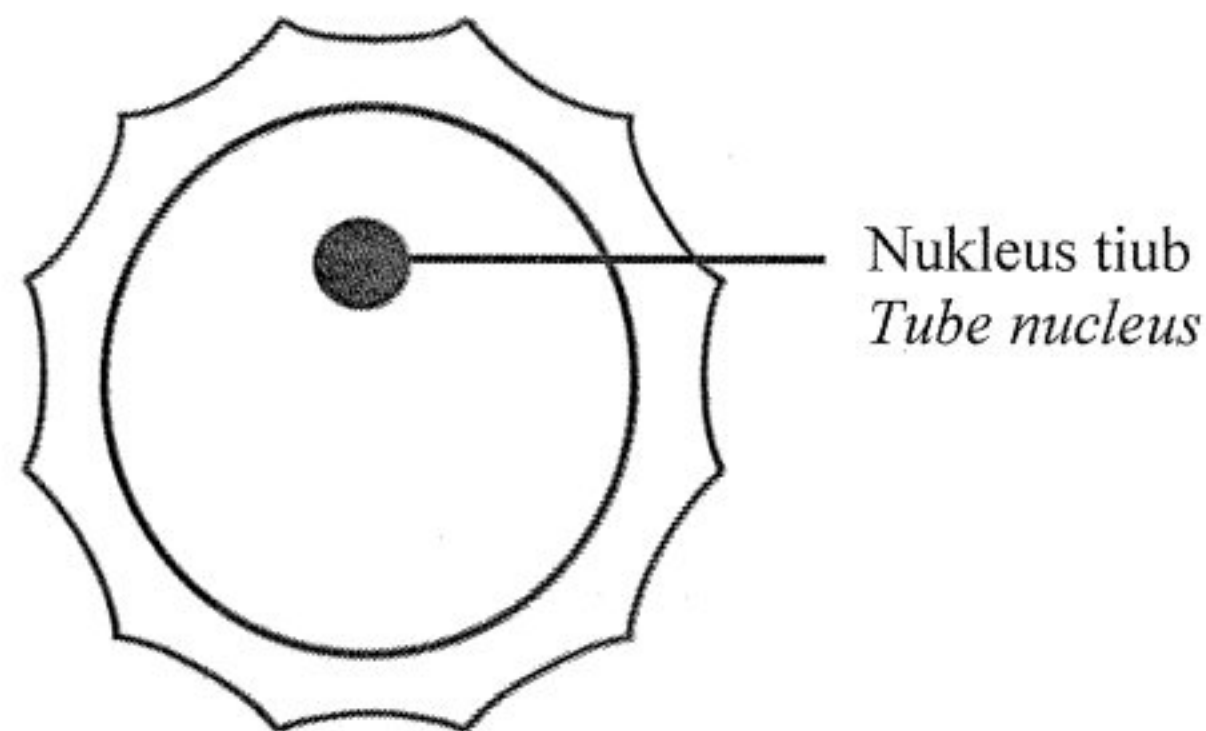
What is the cause of the response?

- A Auksin merencat pemanjangan sel pada bahagian yang terdedah cahaya
Auxin inhibits cell elongation at the exposed side
- B Auksin merangsang pemanjangan sel pada bahagian yang terdedah cahaya
Auxin stimulates cell elongation at part exposed to light
- C Kepekatan auksin lebih tinggi di kawasan yang terlindung daripada cahaya
The concentration of auxin is higher on the shaded side
- D Kepekatan auksin lebih tinggi di kawasan yang terdedah kepada cahaya
The concentration of auxin is higher on the exposed side

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32. Rajah 21 menunjukkan butir debunga matang yang abnormal.

Diagram 21 shows an abnormal matured pollen grain.



Rajah 21
Diagram 21

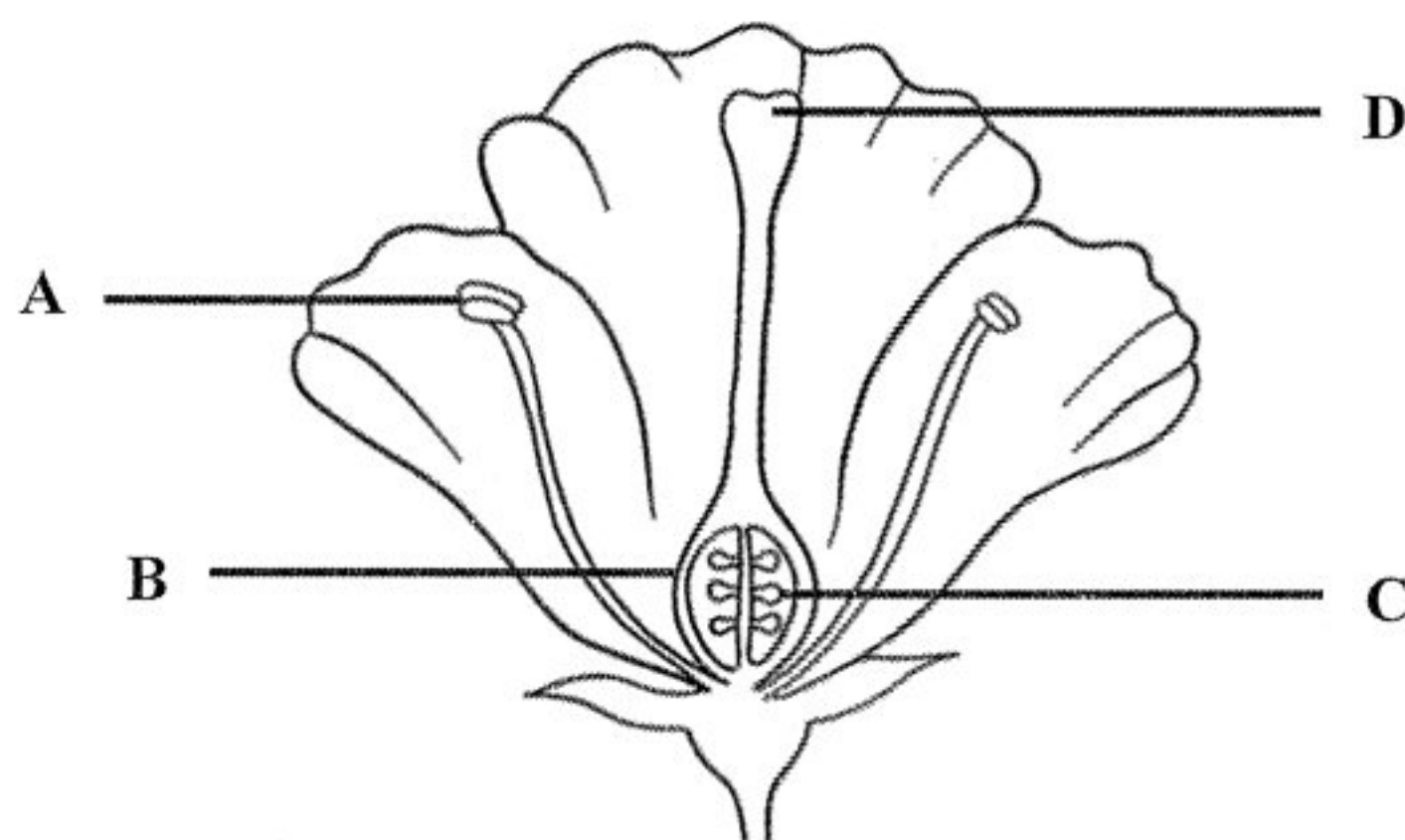
Apakah kesan terhadap proses persenyawaan?

What is the effect on the fertilization process?

- A Pendebungaan tidak berlaku
Pollination does not occur
- B Butir debunga tidak bercambah
Pollen tube does not germinate
- C Tiub debunga tidak terbentuk
Pollen grain is not formed
- D Gamet jantan tidak terbentuk
Male gametes are not formed

33. Rajah 22 menunjukkan keratan membujur sekuntum bunga.

Diagram 22 shows a longitudinal section of a flower.



Rajah 22
Diagram 22

Antara struktur A, B, C dan D, di manakah pendebungaan berlaku?

Which of the structure A, B, C or D, does the pollination take place?

34. Maklumat berikut adalah ciri - ciri sejenis tumbuhan berdasarkan habitat.

The following information are the characteristics of a plant based on its habitat.

- Mempunyai daun sukulen untuk menyimpan air
Have succulent leaves to store water
- Mempunyai akar pernafasan untuk pertukaran gas
Have breathing roots for gaseous exchange

Apakah pengelasan bagi tumbuhan tersebut?

What is the classification of the plant?

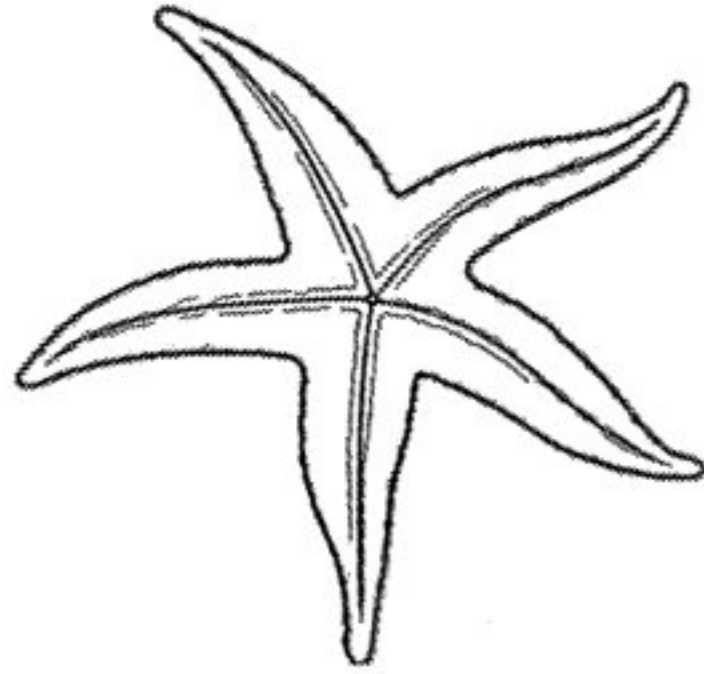
- A Halofit
Halophytes
- B Hidrofit
Hydrophytes
- C Mesofit
Mesophytes
- D Xerofit
Xerophytes

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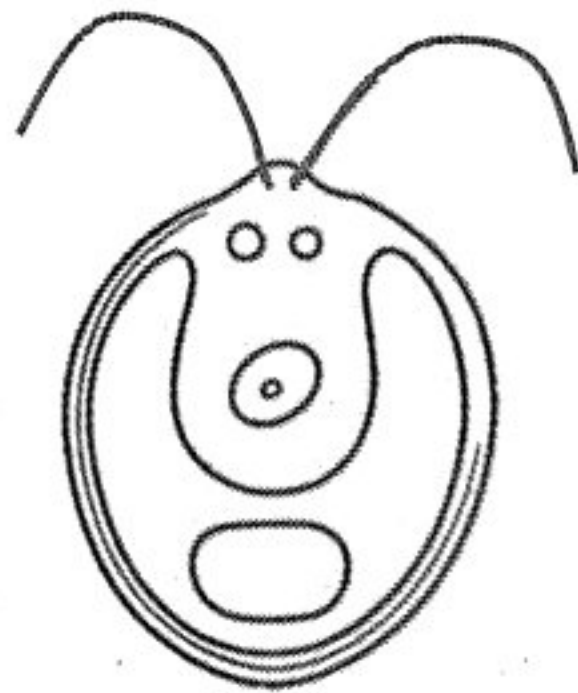
35. Antara berikut, organisma yang manakah dikelaskan dalam alam fungi?

Which of the following organisms is classified in the fungi kingdom?

A



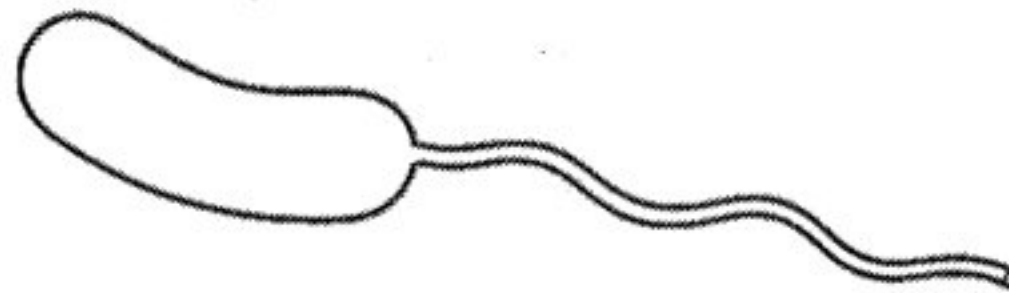
B



C

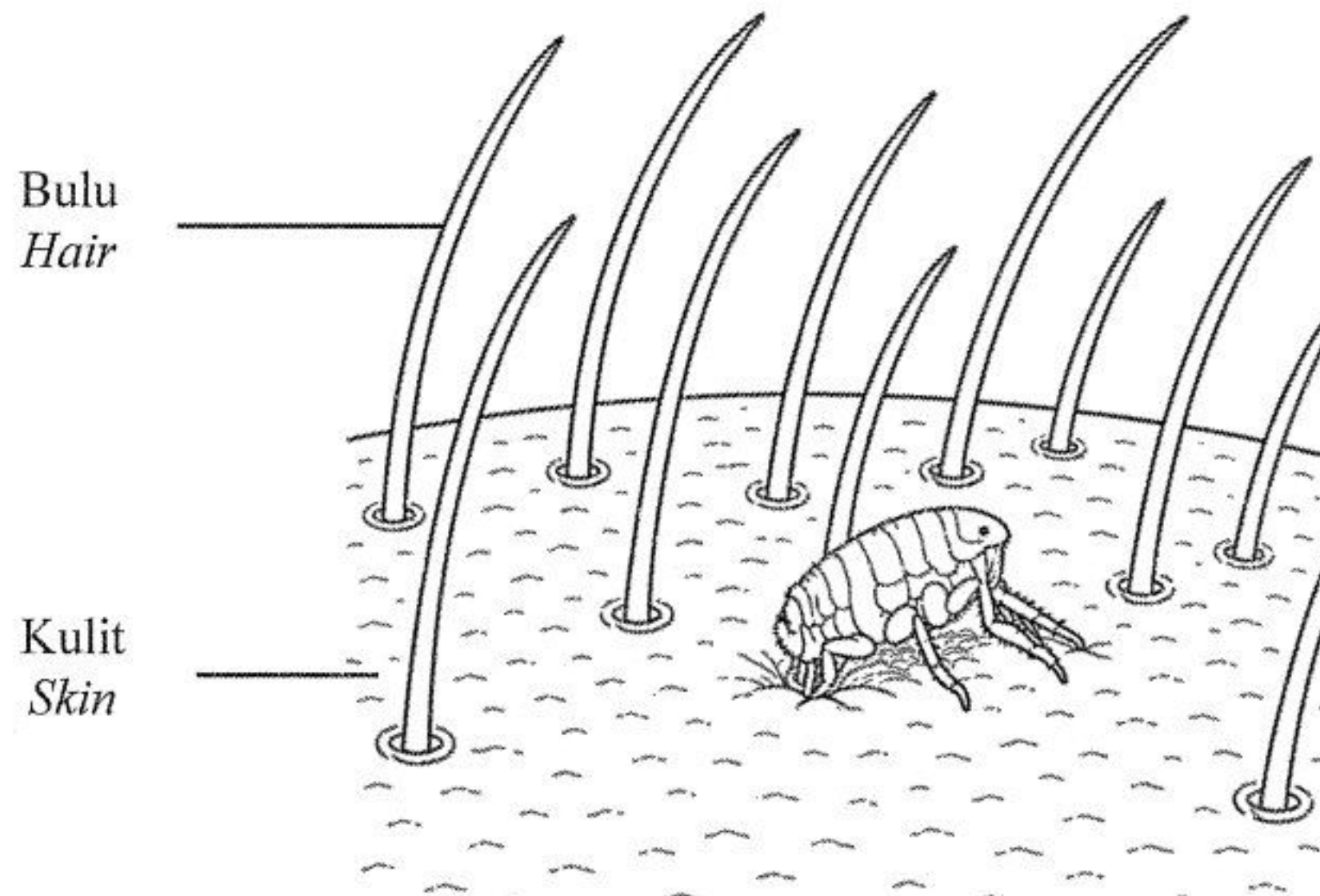


D



36. Rajah 23 menunjukkan satu organisma pada badan kucing.

Diagram 23 shows an organism on the body of a cat.



Rajah 23
Diagram 23

Antara berikut, manakah yang betul mengenai tabiat nutrisi organisma tersebut?

Which of the following is correct about the nutritional habits of the organism?

- A** Mencernakan bahan organik pepejal yang kemudiannya diserap ke dalam badan

Digest solid organic substances which are then absorbed into the body

- B** Mensintesis sebatian organik daripada karbon dioksida dan tenaga cahaya

Synthesize organic compounds from carbon dioxide and light energy

- C** Memperoleh nutrien daripada bahan organik yang mati dan mereput

Gain nutrients from dead and decaying organic substances

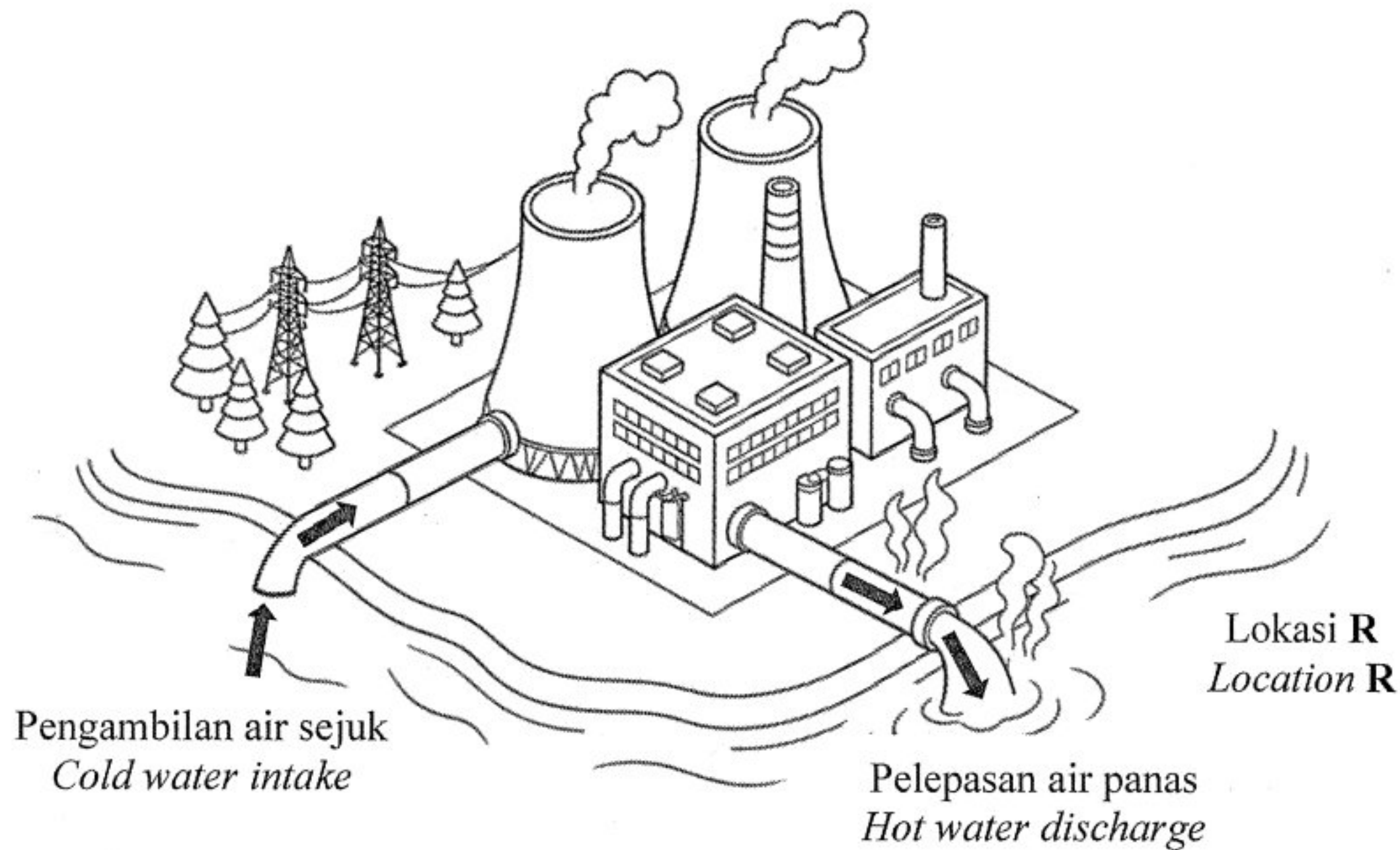
- D** Menyerap nutrien daripada perumah

Absorbs nutrients from host

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37. Rajah 24 menunjukkan satu aktiviti yang berlaku berhampiran satu sungai.

Diagram 24 shows an activity that occurs near a river.



Rajah 24
Diagram 24

Kajian Jabatan Alam Sekitar mendapati populasi organisma akuatik di lokasi R semakin berkurang.

Antara langkah berikut, yang manakah paling berkesan untuk mengatasi masalah ini?

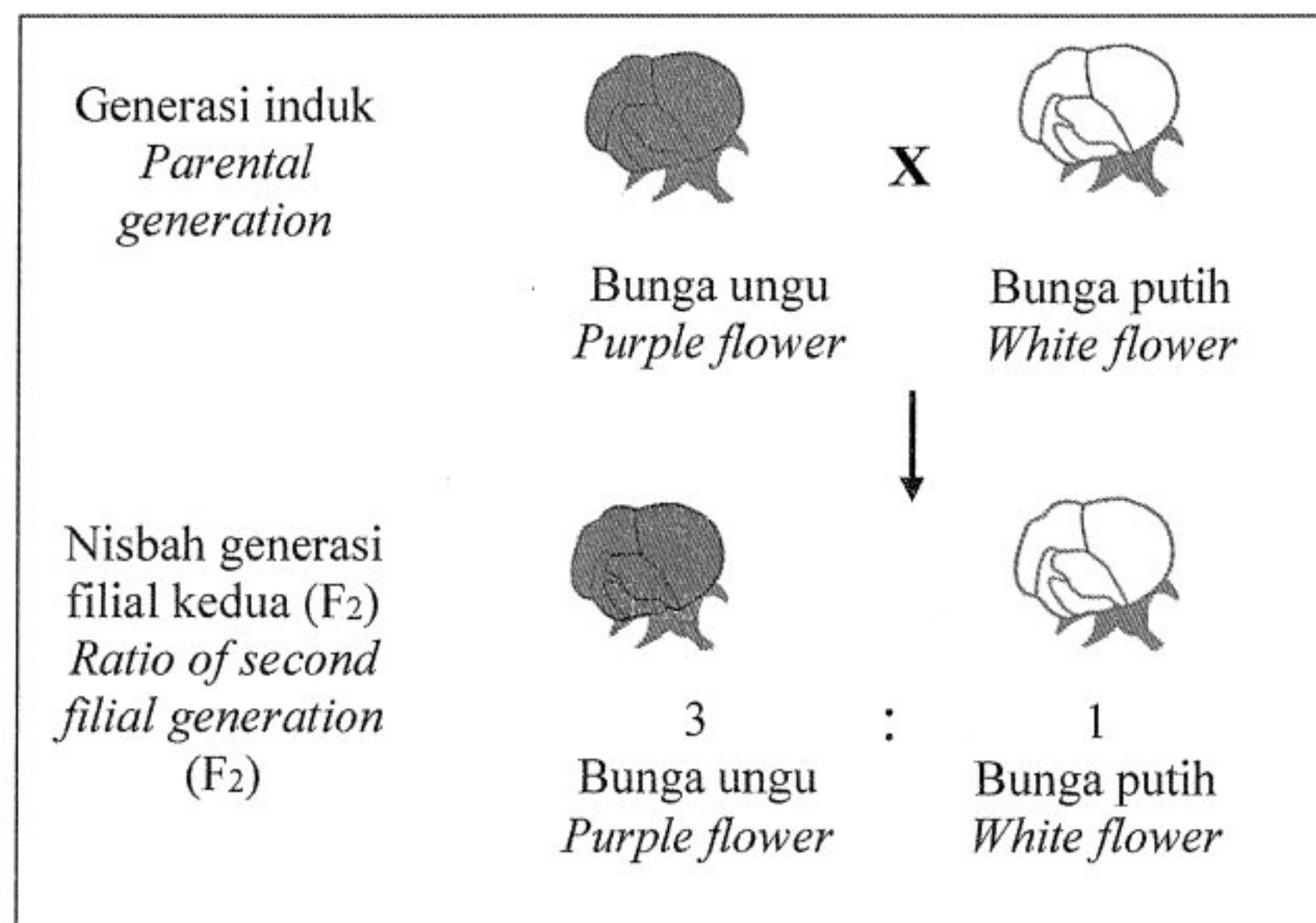
Research by Department of Environment found that the population of aquatic organisms at location R has decreased.

Which of the following is best to overcome the problem?

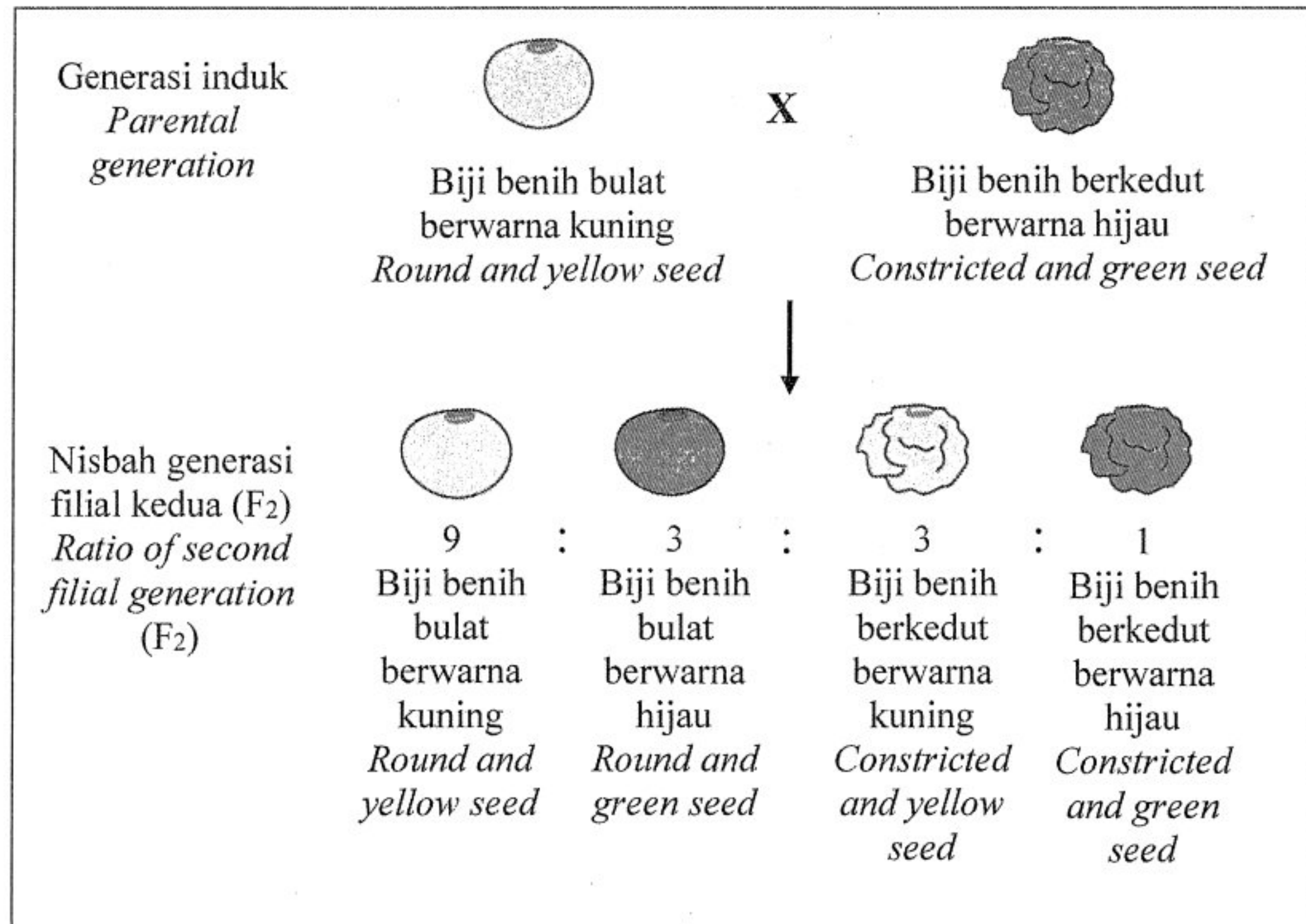
- A Menanam lebih banyak pokok di tebing sungai untuk menurunkan suhu persekitaran
Planting more trees on the riverbank to reduce surrounding temperature
- B Membina kolam penyejuk untuk menurunkan suhu air sebelum dilepaskan
Build a cooling pond to lower water temperature before discharge
- C Mendalamkan dasar sungai untuk meningkatkan kelajuan aliran air sungai
Deepening the riverbed to increase speed of water flow
- D Menanam keladi bunting dalam sungai untuk menjalankan fitoremediasi
Plant water hyacinth in the river to carry out phytoremediation

38. Rajah 25 (a) dan Rajah 25 (b) menunjukkan dua jenis perwarisan dalam Hukum Mendel.

Diagram 25 (a) and Diagram 25 (b) show two types of inheritance in Mendel Law.



Rajah 25 (a)
Diagram 25 (a)



Rajah 25 (b)
Diagram 25 (b)

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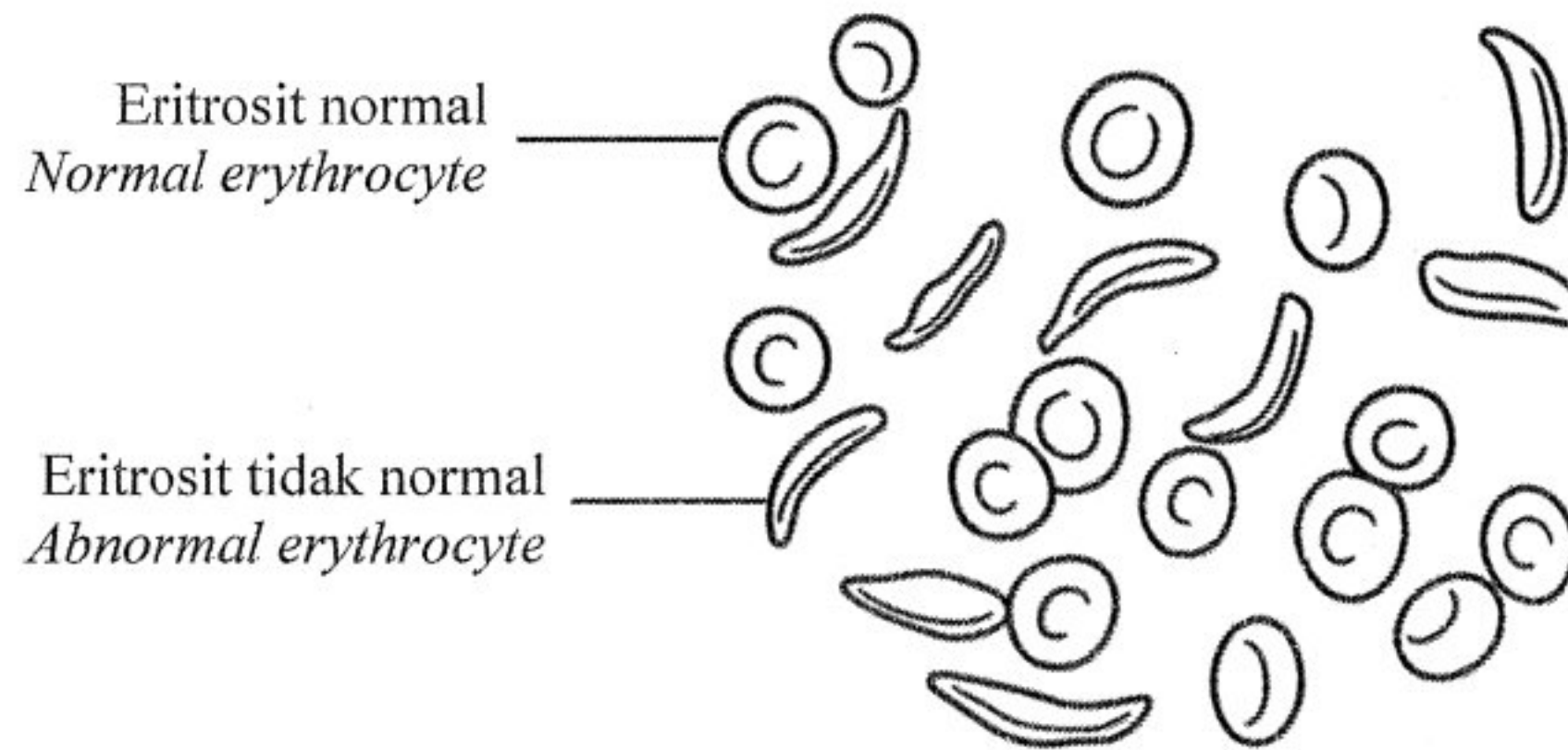
Antara yang berikut, padanan manakah yang betul mengenai kedua-dua jenis perwarisan?

Which of the following is the correct match regarding both types of inheritance?

	Rajah 25 (a) Diagram 25 (a)	Rajah 25 (b) Diagram 25 (b)
A	Melibatkan perwarisan satu ciri <i>Involves one characteristic inheritance</i>	Melibatkan perwarisan dua ciri <i>Involves two characteristics inheritance</i>
B	Dikawal oleh gen yang berlainan <i>Controlled by different genes</i>	Dikawal oleh gen yang sama <i>Controlled by same gene</i>
C	Mematuhi Hukum Pengaturan Bebas <i>Follow Law of Independent assortment</i>	Mematuhi Hukum Segregasi <i>Follow Law of Segregation</i>
D	Melibatkan dua pasang alel <i>Involves two pairs of alleles</i>	Melibatkan sepasang alel <i>Involve a pair of alleles</i>

39. Rajah 26 menunjukkan eritrosit yang terbentuk akibat mutasi gen.

Diagram 26 shows erythrocytes undergone gene mutation.



Rajah 26
Diagram 26

Antara urutan bes berikut, yang manakah menyebabkan keadaan sel tersebut?

Which of the following base sequences cause the cell condition?

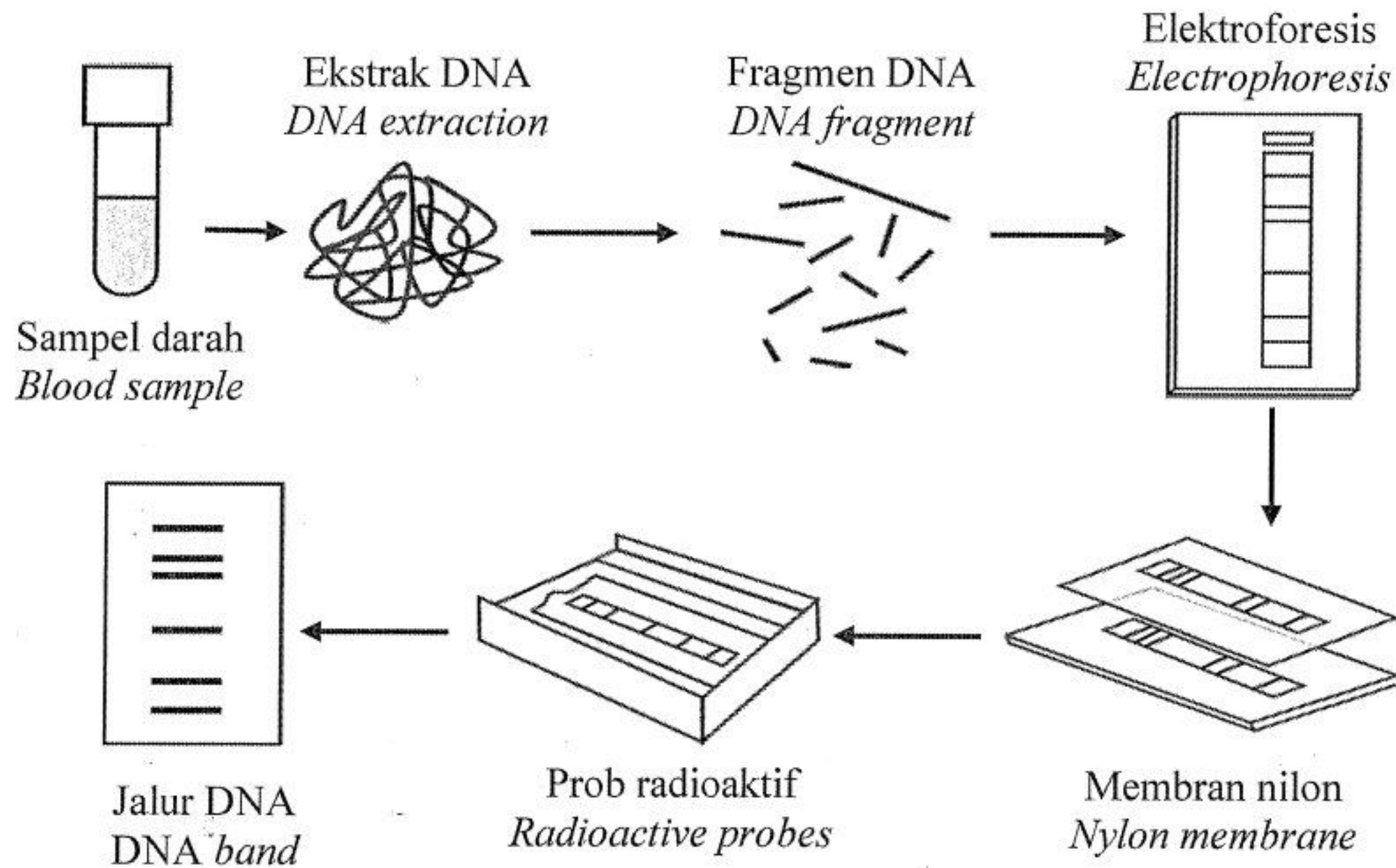
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	Urutan bes asal <i>Original base sequence</i>	Urutan bes yang bermutasi <i>Mutated base sequence</i>
A	C C T G A G	C C T G T G
B	C C T G A G	C C T G A T G
C	C C T G A G	C C T G A

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40. Rajah 27 menunjukkan satu teknik yang digunakan dalam bidang bioteknologi.

Diagram 27 shows a technique used in the biotechnology field.



Rajah 27
Diagram 27

Apakah tujuan teknik yang ditunjukkan?

What is the purpose of the technique shown?

- A Untuk merawat penyakit genetik
To treat genetic disease
- B Untuk menghasilkan organisma terubah suai genetik
To produce genetically modified organisms
- C Untuk mengenal pasti keserasian penderma organ dengan penerima
To identify the compatibility between organ donors and recipients
- D Untuk menghasilkan organisma yang rintang terhadap penyakit
To produce organisms that are resistance to diseases

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KERTAS SOALAN TAMAT
END OF QUESTION PAPER